

P@SHA

Pakistan Software Houses Association for IT & ITES

The Great Divide
**The Industry-Academia
Skills Gap Report 2022**



The logo for P@SHA, featuring the text 'P@SHA' in a bold, black, sans-serif font. The '@' symbol is red and contains a white circle. The background of the page features faint, large, red-outlined letters 'P@SHA'.

The Great Divide: The Industry-Academia Skills Gap 2022

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Foreword

I am pleased to present **The Great Divide: Industry–Academia Skill Gap Analysis 2022**, an effort by P@SHA to create awareness and understanding of the gap that exists between skills taught at universities vs. skills required by the IT industry.

Pakistan is facing National Digital Skill Emergency at the moment. P@SHA member companies have over 20,000 job openings that need to be filled in the next few months. The IT industry has also reported that out of 25,000 graduating students, only 10% are employable. This represents a grave situation that can only be addressed by bridging the gap between industry and academia.

P@SHA has been working tirelessly to play its role in human capital development for IT and ITeS industry. In the last year, we have closely worked with different stakeholders to highlight the skill-emergency in the IT industry. We appreciate Pakistan Software Export Board (PSEB)'s efforts in facilitating and launching initiatives for the growth and skill development of the IT industry. We are aware of the immediate need to focus on the human capital related to technological innovations. TechLift, Industry–led Boot Camps, is one such initiative where P@SHA as a strategic partner is working with a consortium of IT companies to train 4,000 unemployed graduates across Pakistan. Programs like P@SHA Academia Bridge Program, with an industry and academia partner, have been involved in equipping university students with the required technical skills for the IT industry. To meet the upskilling needs of the existing resources, we have developed and launched programs like the P@SHA Skills Development Program (PSDP) and Master Classes.

However, the challenge of lack of skilled resources can only be solved by bridging the gap between academia and industry!

We see this report as the first chapter in the IT industry's history as P@SHA coming forward to understand the gap between academia and the IT industry. We believe data and problem identification is the key to a solution, hence this report is our first effort to capture the scope of the problem. We plan to use the gathered data in the decision-making and planning of our next initiatives and programs.

This is also the first report of P@SHA which took inputs from IT students directly. Over time, P@SHA plans to engage all relevant stakeholders in the IT industry to break down the problem and come together in addressing the skill-emergency in Pakistan.

I would like to express gratitude to all industry leaders and stakeholders as well as students for sharing their valuable feedback that helped us develop this report. I would also like to thank P@SHA Skill Development Committee for taking out time to review the report and for their valuable feedback.

I am hopeful that this report will serve as the cornerstone for the relevant stakeholders for initiating programs and discussions focused on human capital development, a critical contributor to the economy and digital transformation of Pakistan. If you have any queries, comments, or suggestions, please feel free to reach out to me at sg@pasha.org.pk or write to the P@SHA Research Team at services@pasha.org.pk.

Hira Zainab
Secretary General



Chairman's Message

Message by Chairman

Congratulations to the P@SHA Secretariat team for publishing this report that documents the gaps between industry and academia! I am pleased to see how P@SHA Research Team has strengthened and allowed data-driven decision-making for launching different programs for enablement of IT and ITeS industry in Pakistan.

Pakistan is developing rapidly in the field of technology and if this momentum continues then a technological revolution is expected to take place. IT is one of the leading sector in Pakistan, with the utmost potential and ability to drive economic growth in Pakistan. According to an [estimate](#), digital transformation could add about Rs 9.7 trillion (59.7 billion USD) in annual economic value by 2030, equivalent to about 19% of the country's GDP in 2020. However, having grown from a nascent industry, it is facing some key issues that require addressing to meet its true potential. This could only be achieved if all involved stakeholders work in synergy in the attainment of the same goal.

According to [Unlocking Pakistan's Digital Potential](#), Pakistan is home to more than 300,000 IT professionals, producing over 25,000 IT graduates annually. Unfortunately, despite the immense pool of talent, the IT & ITeS industry is still struggling to meet its needs and demands for skilled resources. According to [P@SHA Skills Requirement Report 2021](#), participating companies have shown the need of hiring approximately 20,000 resources in the next few months. According to a study by [Gallup Pakistan](#), the top IT companies only hire 10% of graduates from lower-tier universities. IT companies with low-end IT services, however, end up employing 50% of graduates. This represents a grave situation that can only be addressed through proactive efforts toward industry-academia collaboration, skills development programs, reskilling, and upskilling program initiatives by the relevant stakeholders.

This report confirms and captures the gaps between industry requirements and university preferences. P@SHA's Research Team has worked extensively to share insights from both academia and industry which can pave the way for future initiatives, programs, and collaborating opportunities.

I sincerely hope that you'll find **The Great Divide: Industry-Academia Skill Gap Analysis 2022** helpful.

Badar Khushnood
Chairman



Acknowledgements

We would like to express our gratitude to all industry experts, academic experts and students who participated in the study and collaborated with P@SHA. We would like to especially acknowledge our working group that was instrumental in helping us develop and polish the structure of our research.

The logo for arbisoft, featuring the word "arbisoft" in a lowercase, sans-serif font. The "a" and "i" are blue, while the rest of the letters are grey.The logo for CureMD, featuring the word "CureMD" in a blue, sans-serif font with a trademark symbol. Below it, the tagline "Practice without boundaries" is written in a smaller, grey font.The logo for DPL, featuring the letters "DPL" in a bold, red, sans-serif font. Below it, the tagline "INNOVATION AS A SERVICE™" is written in a smaller, grey font.The logo for HORIZON Technologies, featuring the word "HORIZON" in a bold, black, sans-serif font above the word "Technologies" in a blue, sans-serif font. A yellow and blue graphic element is positioned to the right of the text.The logo for SMART IS PAKISTAN, featuring three orange diagonal bars to the left of the text "SMART IS" in a bold, black, sans-serif font, with "PAKISTAN" in a smaller font below it.The logo for stewart, featuring three red diagonal bars to the left of the word "stewart" in a lowercase, black, sans-serif font.The logo for Zeta Technologies (Pvt.) Ltd., featuring a stylized red and white "Z" symbol to the left of the text "Zeta Technologies (Pvt.) Ltd." in a black, sans-serif font.The logo for ZC, featuring the letters "ZC" in a bold, black, sans-serif font. A blue circle with the number "2" is positioned between the "Z" and "C", and there are three vertical lines to the right of the "C".



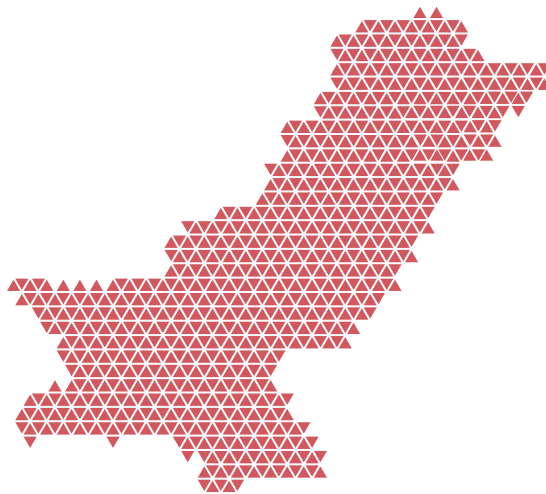
About P@SHA

Pakistan Software Houses Association for IT and ITeS (P@SHA) is one of the oldest ICT associations of the region and the sole trade association in Pakistan representing the industry since 1992. P@SHA is the only Pakistani entity globally registered with and recognized by institutions such as WISTA (World Information Technology and Services Alliance), ASOCIO (Asian Oceanic Computing Industry Organization) and APICTA (Asia Pacific ICT Alliance). Over the years, P@SHA has registered more than **1,000 companies across Pakistan** and has been the voice of the industry, advocating policy initiatives and working towards creating a high growth sustainable business environment in the country.



1,000+

Member Companies



500+

Active Member

P@SHA has been constantly making efforts toward developing a strong insightful database and research repository. In order to make informed decisions, the availability of updated information and data insights plays a key role. In the past P@SHA has worked on various research reports highlighting the key concerns and issues of the IT & ITeS Industry. Some of the research reports by P@SHA are; P@SHA Salary Survey Reports, Diversity & Inclusion Framework Report, IT Skills Requirements Report 2021, Pakistan IT Skills Report 2021, Impact of Tax Exemption Removal, Budget Recommendations 2022, and Comparative Analysis: Support Policies in IT Emerging Economies. The key areas covered in these reports are policy and budgeting, salary benchmarking and HR practices, IT skills need and requirements, Diversity & Inclusion, and tax implications and impact on the IT & ITeS Industry of Pakistan.

About **Industry-Academia Skills Gap Report 2022**

The Industry-Academia Skills Gaps Report 2021 aims to conduct an in-depth analysis of the demand and supply of the universities and IT & ITeS companies of Pakistan. The objective was to present a birds-eye view from the IT industry perspective to understand their needs and demands regarding the skilled resources. As a major contributor of resources, the study also unravels the current skills analysis of the education sector and students of IT relevant degrees from top-tier universities in Pakistan.

For this purpose, the study gathered insights from a sample consisting of **100+ final year university** students and **90+ IT companies** to draw a credible comparison between the demanded and supplied skill set for the IT industry. In order to further support the insights, 10 industry experts were interviewed for a situational analysis. Them, along with 10 academic experts were able to provide recommendations and action items for bridging the skills gap as well.

The study was conducted across a series of subjects and touchpoints in order to get a holistic view of the problem at hand. Firstly, the target audience and target were considered as follows;

Where,



Target Audience

Refers to the groups benefiting out of the study

- **Primary Audience**
IT & ITeS Companies
- **Secondary Audience**
Training Institutes & Universities



Target Sample

Refers to the groups that will be studied

- **HR Personnel** at IT & ITeS Companies
- **Graduate Students**
- **Academic Experts** from Universities

Executive **Summary**

The research for the industry-academia skills gap 2022 report was conducted in **three phases**. In the first **phase**, market analysis was the core focus. A literature review of the global skill-based reports was done to understand the need and supply of skills globally. To have in-depth analysis, a skills analysis survey was designed and circulated among university students. The objective of this survey was to analyze the current skill sets of graduating students hoping to join the IT workforce. A short survey and 10 one-on-one zoom interviews were conducted with the HR personnel to gauge the demands of IT. In the **second phase**, an in-depth analysis of the current market dynamics derived from data collected in the first phase was analyzed. 10 one-on-one Interviews with academia & industry experts were performed to discuss the challenges, solutions & future needs of the IT industry. In the **final phase**, data collected from interviews and survey data was used to come up with an industry-academia collaboration model.

Skills gap analysis is an important process that looks into the average skills and capabilities of the resources currently working or looking to join the IT and ITeS sector of Pakistan. The research conducted tried to address the question: **what are the skills required to fresh graduates to secure employment in the IT sector of Pakistan?**

This is a problem for both prospective employees and companies alike as companies overwhelmingly agree that graduates are not equipped skill-wise to handle, understand and deliver on the needs of the IT sector of Pakistan. When asked, whether the skill **set of recent graduates from IT- relevant degrees meet industry needs?**

Only **20% of HR personnel** from the industry agreed that the recent graduates meet the industry requirements in terms of skills. This shows a major industry-academia skills gap exists, and so, we look into the dynamics of why it does and how it can be bridged.

To give you a holistic overview of the analysis, the report is divided into six sections.

- **Section 1:** Skill set demands of the IT Industry: The Current Employer Demand of Skilled Resource
- **Section 2:** Current Technical Skill Analysis of the Fresh Graduates
- **Section 3:** Identifying the industry-academia skills gap
- **Section 4:** Bridging the Skills Gap
- **Section 5:** The Job Market
- **Section 6:** Recommendations to bridge the gap:

Section 1: Skill set demands of the IT Industry: The Current Employer Demand of Skilled Resource

Key metrics to access hiring potential

Industry insights on young professionals and the fresh graduates

The ideal candidate profile: Industry demands (technical skills)

Future technical skills as per

Section 2: Skill set Supply of the Academia: The Current Profile of Fresh Graduates

Formal education & skills development

Top technical skills taught in universities - Nationwide & region-wise

Final Year Projects (FYP)

Section 3: Identifying the industry-academia skills gap

Technical skills gap: nationwide & region wise

Non-technical skills gap/soft skills: nationwide & region wise

The industry's take on the existence of the skills gap

Section 4: Bridging the Skills Gap

Organizational skill-building Training

Training effectiveness, frequency and budget

Preferred training methods/modes

Technical training topics

Section 5: The Job Market

Hiring Frequency across regions

Annual vacancies & Hiring practices

Hiring mediums

Most sought-after job roles by fresh graduates

Job roles in the industry

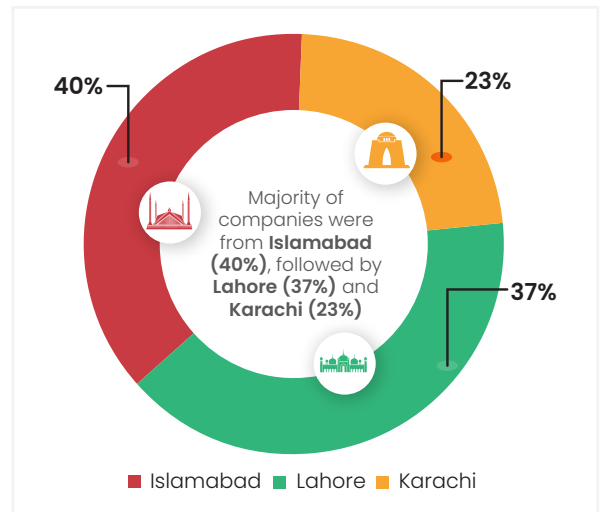
The COVID-19 Impact

Section 6: Recommendations to bridge the gap

Participants **Overview**

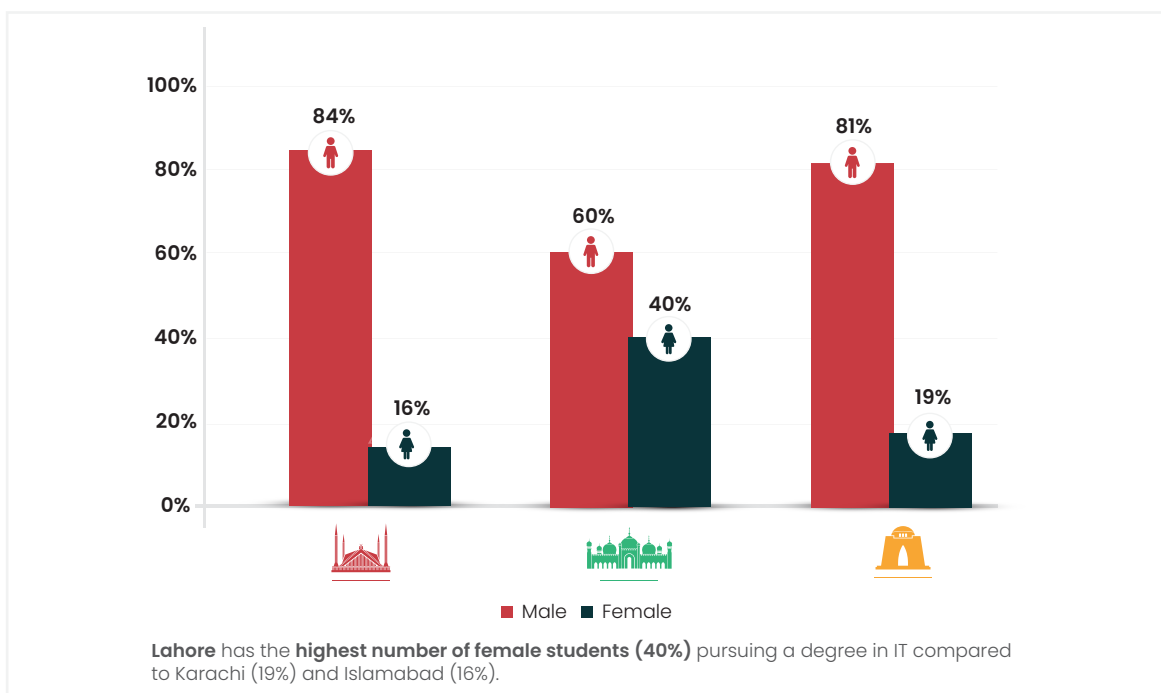
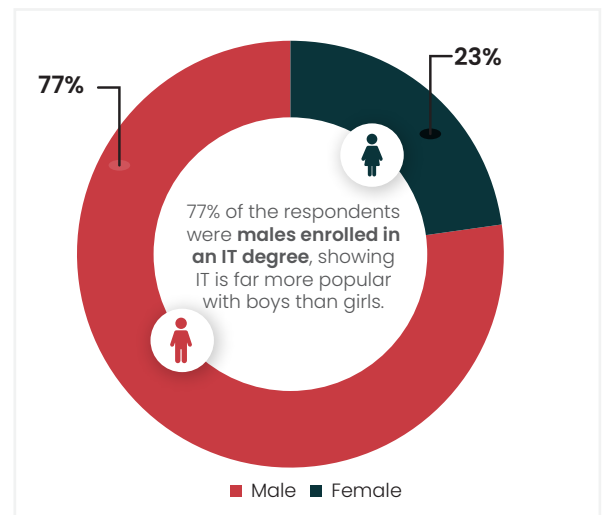
The Industry Sample

The survey was conducted across different **IT & ITes** companies of Pakistan. With **90+companies** and **multiple industry professionals** being consulted; this data presents the lens of the IT industry in terms of skill development and analysis. It also sheds light on the type of IT related skills required and the kind of activities undertaken to develop the desired skill sets of prospective employees for the IT sector. Recommendations added also end a model for actionable items to address the skills gap from this perspective.



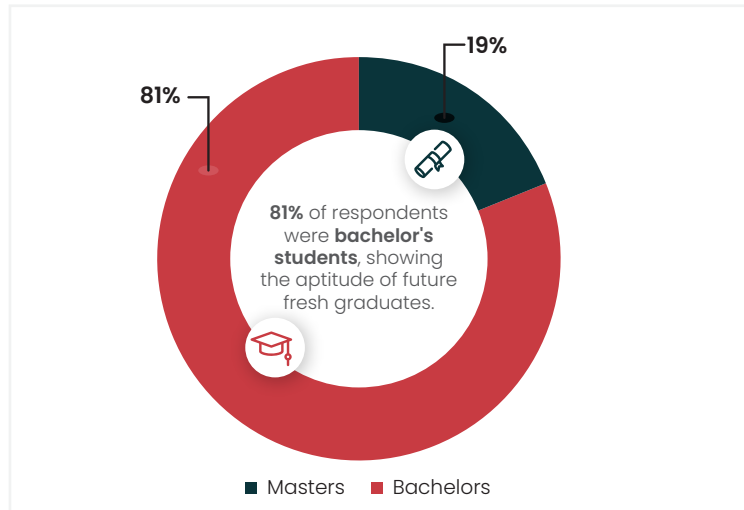
The Academic Sample

The survey was conducted across a series of **top and middle tiered universities of Pakistan**. With **100+ students** and **multiple academic professionals** being consulted; this data presents the lens of the education sector in terms of skill development. It also sheds light on the type of IT related qualifications and quality of graduates considered to be prospective employees for the IT sector. Recommendations added also lend a model for actionable items to address the skills gap from this perspective.



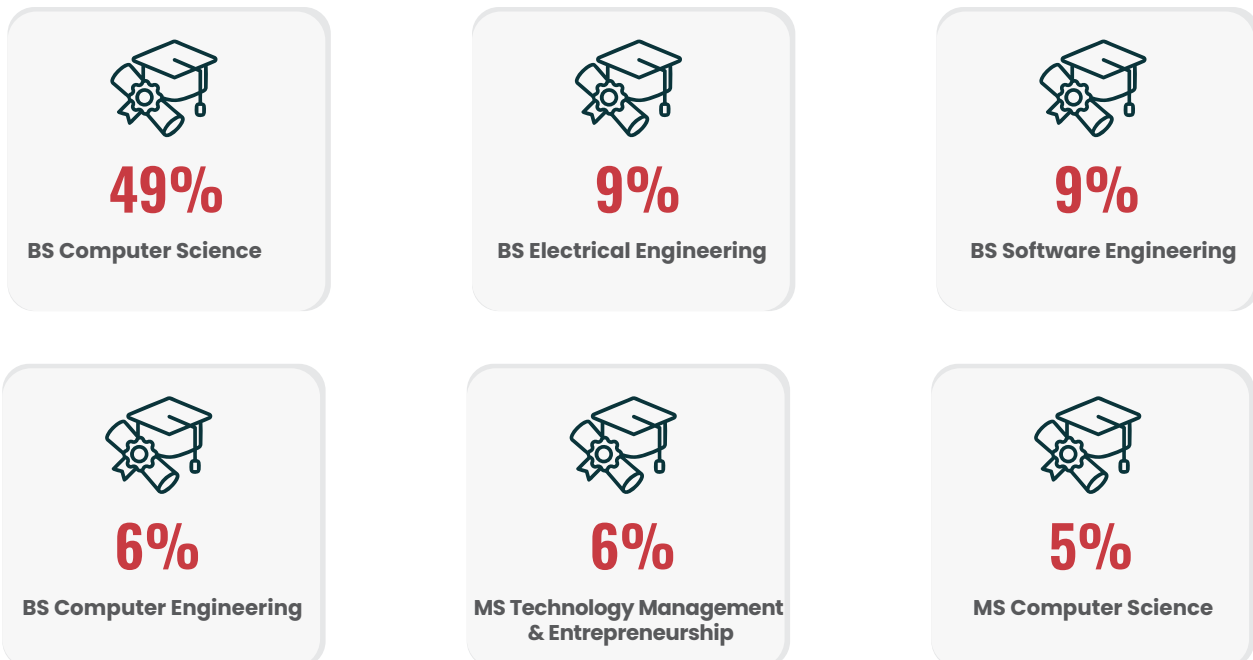
Qualification Level of students

When it comes to IT relevant degrees, the most common qualifications include Bachelors and Masters programs. Amongst these, most students opt for Bachelors programs that span over 4 years on an average while few opt for higher levels of education through a 1-2-year Master's program. Overall, our sample, representative of this difference, has the following distribution



Popular Degree Programs

When it comes to the degree majors, our sample suggests the following as some popular programs;





Skills Gap Analysis

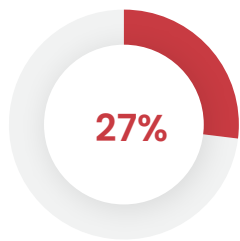
Key Insights

Key Insights: Skills Gap Analysis Report 2021

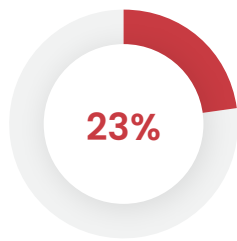


Hiring

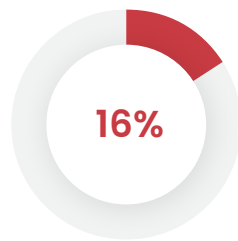
- Strong preference for candidates who have at least a **Bachelor's degree**.
- **Key metrics to assess hiring potential;**



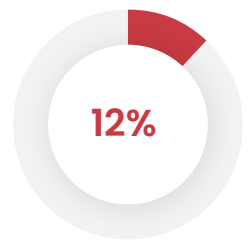
Personality attitudes & work ethics



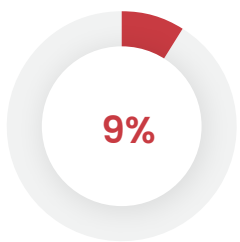
Ability to learn and adaptability



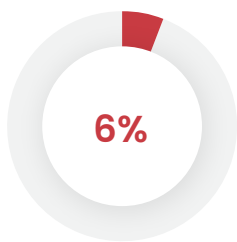
Problem-solving skills



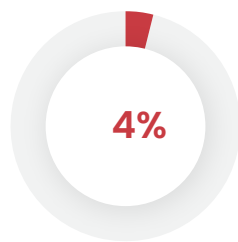
Work Experience



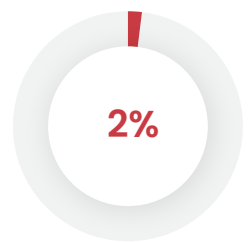
Reputable University degree



Residing City

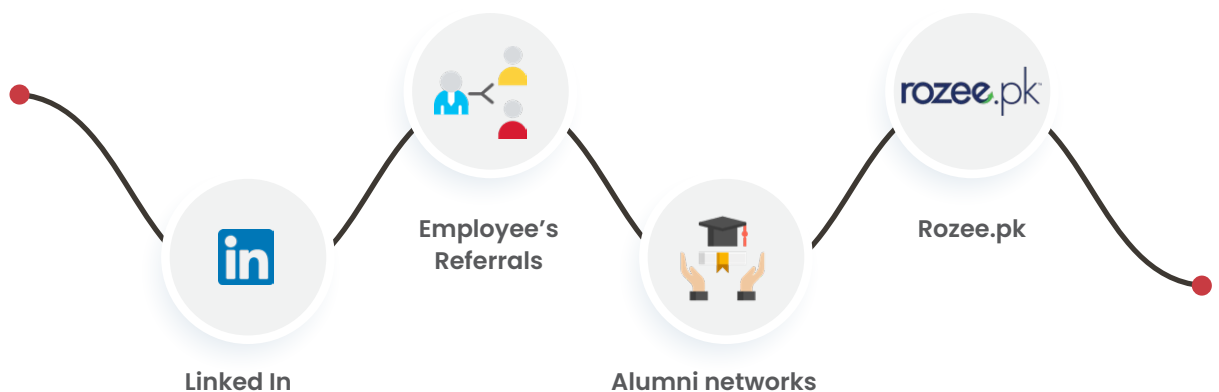


Training needs of candidates



International certification

- Most universities commence **placement efforts in the Spring semester** – ideal time for reaching out to good batch of candidates
- Karachi is a very **viable city to seek jobs for the IT degree holders**
- On average, IT and ITes companies fill **less than 10 positions** annually
- Important **hiring mediums**























Key Insights: Skills Gap Analysis Report 2021














Top in-demand technical skills (Industry)

Top In-demand Technical

 Java	 JavaScript Fullstack (MEAN/MERN)	 PHP(Laravel/CodeIgnitor/Yii/Zend/Drupal/Magento)	 Python	 iOS - Objective C & SWIFT	 C# .NET
 Flutter (Hybrid)	 Android	 AWS Developer Associate	 MICROSOFT SQL	 Project Management Professional	 Jira
 C/C++	 React Native (Hybrid)	 Flutter	 Selenium	 Kotlin	 Microsoft Certified: Azure Fundamentals
 Agile Certified Practitioner,	 SALESFORCE				

Prospective in-demand technical skills

 Mobile Application Development	 Full stack development: JavaScript (MEAN/MERN)	 Flutter	 QA Automation	 Cloud Solutions architecture	 DevOps
 Kotlin	 Selenium	 Azure Fundamentals	 Ruby on Rails	 PHP(Laravel).	

IT industry is has shown inclination towards technical domains (Artificial Intelligence, Block chain etc.) whereas academia remains unaware of the frequent change in industry needs and demands

Key Insights: Skills Gap Analysis Report 2021



In-Demand Technical Skills (Academia)















○ Top in-demand Technical Tracks taught by academia nationwide are;

 Java	 C/C++	 Python	 JavaScript Fullstack (MEAN/MERN)	 Microsoft SQL Server MICROSOFT SQL	 C# .NET
 Oracle Database 12c Administrator	 MySQL 5.7 Database Administrator	 Oracle Certified Professional	 Project Management Professional	 Unity	 React Native (Hybrid)
 PHP(Laravel/CodeIgnitor/ Yii/Zend/Drupal/ Magento)	 Agile Certified Practitioner	 Certified Information Security Manager CISM (Certified Information Security Manager)	 Asana	 AWS Developer- Associate	 Flutter (Hybrid)
 Jira	 Professional Scrum Master				

○ Technical skills being taught in universities with **minimum relevance** in the IT industry are

 VBA	 MATLAB	 SPSS	 R languages
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○ Top technical skills self-taught by the students nationwide are;

 Java	 Python	 JavaScript Fullstack (MEAN/MERN)	 Flutter	 Android	 Project Management Professional
 AWS Developer- Associate	 Blender	 Selenium	 Kotlin	 Postgres	 Oracle Database 12c Administrator
 Jira	 Microsoft Certified: Azure Fundamentals				



In-Demand Technical Skills (Academia)

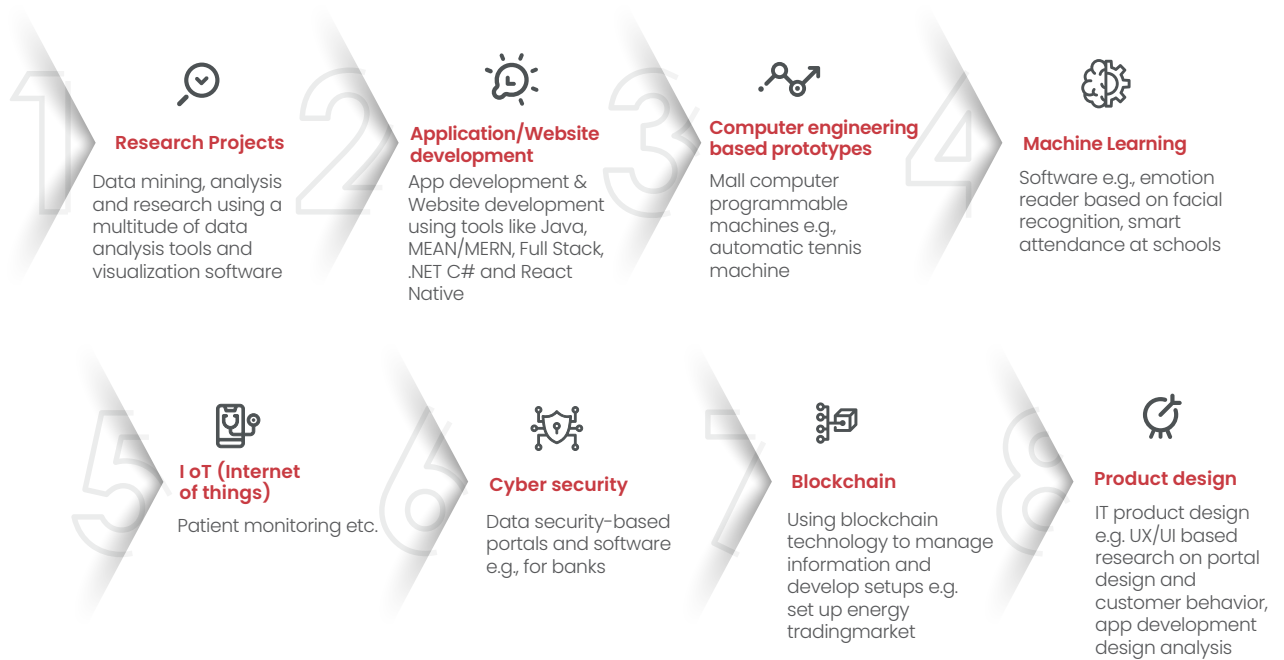
○ Critical Soft skills Required by the IT industry:

Social skills, problem solving, team work, critical thinking, time management, attitude, and communication skills.

○ Critical soft skills taught at universities are;

communication & presentation, research & development, analysis and presentation, digital marketing/ social media marketing, content development & content writing, operations & project management, and business development/ B2B & B2C Sales.

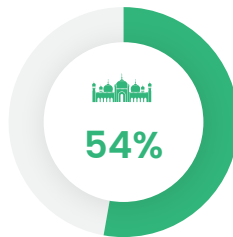
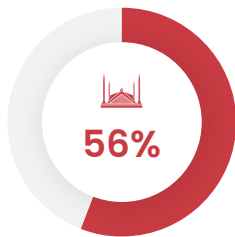
○ Popular Final Year Projects (FYPs) Topics





Organization Training Programs

- Hands-on/ On job training is the most preferred training method



■ Islamabad

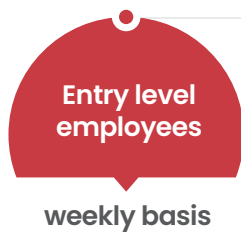
■ Lahore

■ Karachi



Only **14% of companies** have training partners to train their employees.

- Training Frequency:



weekly basis



as per required



quarterly or as required

- Average, training expense for companies is around **around PKR 5,000-30,000** annually per resource



Skillset Demands of the IT Industry

The Current Employer
Demand of Skilled
Resource

Section 1: IT Industry Resource Demands & Prospective Candidates

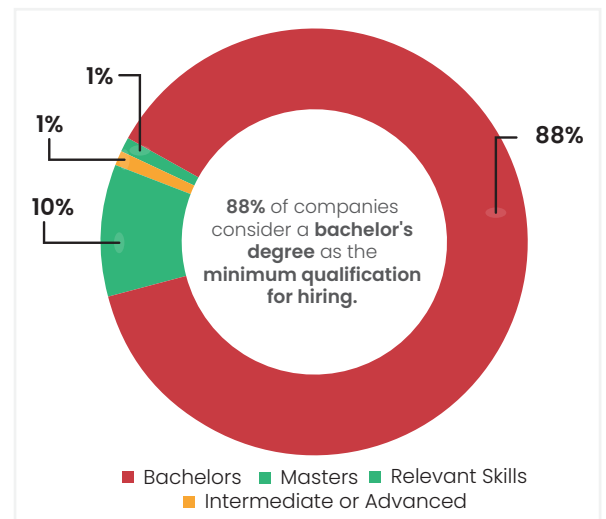
In order to identify where improvements need to occur in terms of skills development, it is important to first look into the demands of the IT sector when looking for their ideal candidates. With respect to this, there are various types of key points we can compare and contrast for the ideal candidate based on skills he has and skills he is expected to know

The Required Candidate Profile: The Industry Perspective

Minimum Qualification

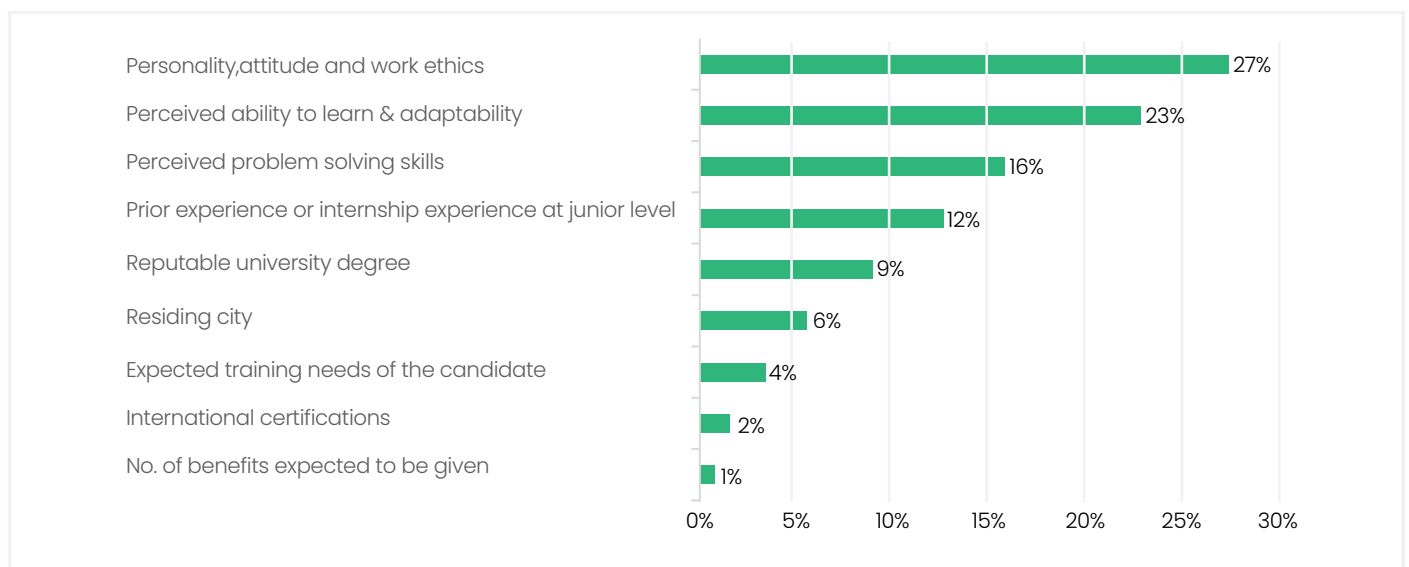
The IT sector has a strong preference for candidates who have a formal education as seen below with most companies seeking to hire at least a Bachelor's degree. Interestingly, some companies are also keen on hiring masters' students instead, this is possible due to the following

- Complex nature of operations
- A focus on having small but more skilled teams
- Access to a more skilled set of people



Key metrics to access hiring potential

Companies look for a set of characteristics apart from skill set when considering if the candidate is well suited to the needs of their particular organization. These include things that are relevant to what the company has to offer the candidate as well as what the candidate can offer the company. Some of these key metrics to assess hiring potential across Pakistan include;



Most companies considered personality, attitude, and work ethics (27%), followed by the ability to learn/adaptability (23%) as one of the most important hiring metrics.

Industry insights on young professionals and prospective employees



Fresh Graduates lack knowledge of the industry needs and demands

Despite showing promise in data-centric roles, candidates lack skills of the technology tracks needed to secure technical jobs in the IT industry. **Only less than 10%** of the students are aware of the industry's needs and demands. Therefore, a conscious effort needs to be made for industry-academia partnerships and collaborations



Companies prefer to hire trainable employees rather than highly-skilled ones

For technical roles, IT companies prefer to hire graduates with good understanding of **basic development skills, mathematics, statistics and logic**. These candidates are later on train according to the needs of the organization.



Soft skills are considered as important attribute for hiring

As companies are growing and going international, they prefer candidates with **good communication and presentation skills**. Currently, there is a huge gap between the soft skills required by the and the ones being taught by universities. Companies seek eloquence as opposed to fluency of the English language to ensure appropriate communication in terms of exchange of ideas with their clients.



Experiences beyond formal education provides an advantage in securing jobs

Freelancing and internship experiences are valuable in filling the gaps that come with lack of exposure and limited business acumen. Extra-Curricular activities are proven extremely helpful in developing soft skills. People with good technical, communication/presentation and people skills are considered good candidates for hiring.



Attitude and work ethics are given equal importance by the recruiters

Attitude, a cultural fit, teamwork capabilities and responsibility in terms of work are considered valuable. Unfortunately, according to the interviews conducted with the HR managers majority of fresh graduates lack these skills.



Accredited Certifications holds value over basic certification programs

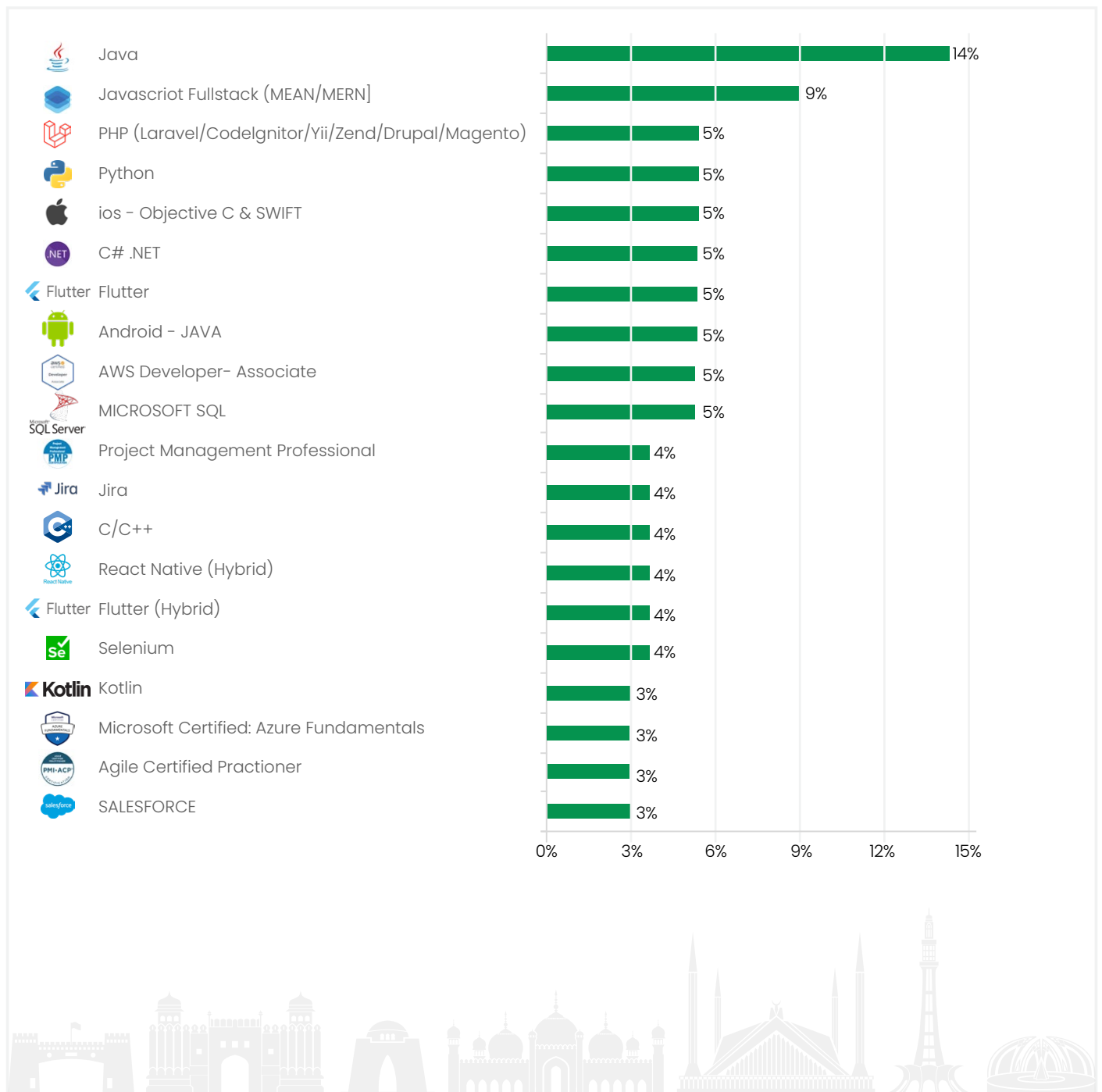
Companies prefer to hire candidates with **accredited certifications**. According to HR managers basic certification programs lack development of advanced skills.

The Ideal Candidate Profile: **Industry Demands**

Technical Skill Set

An integral part of hiring is to look for skilled resources as per the in-demand and relevant technical tracks. For this purpose, we look into the current technical skills which are required by the IT sector. We also consider the current situation in the industry and gather insights from industry experts on the skills analysis of incoming and entry level resources.

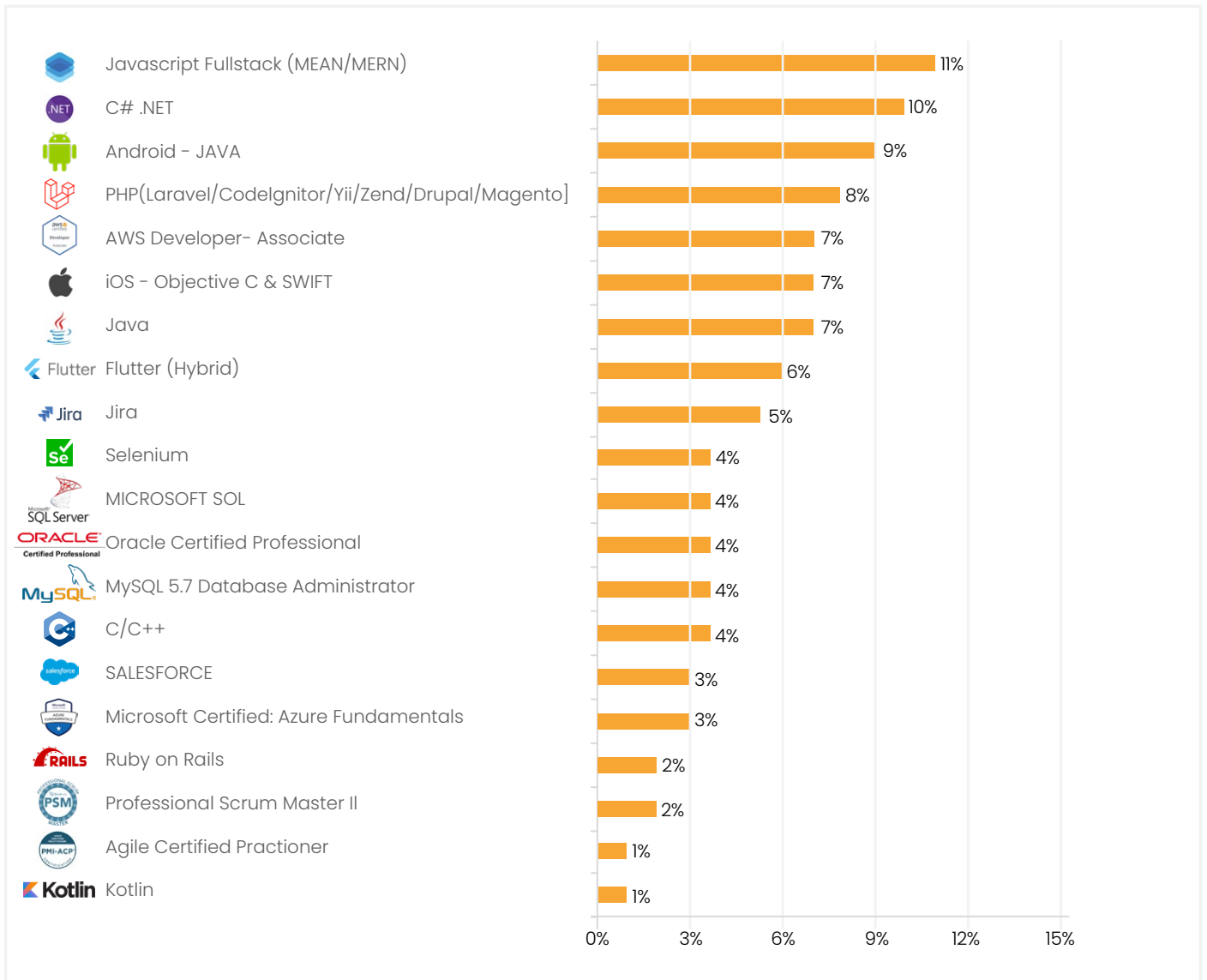
Top Technical skills in-demand by the IT companies - Nationwide



The Ideal Candidate Profile: **Industry Demands**



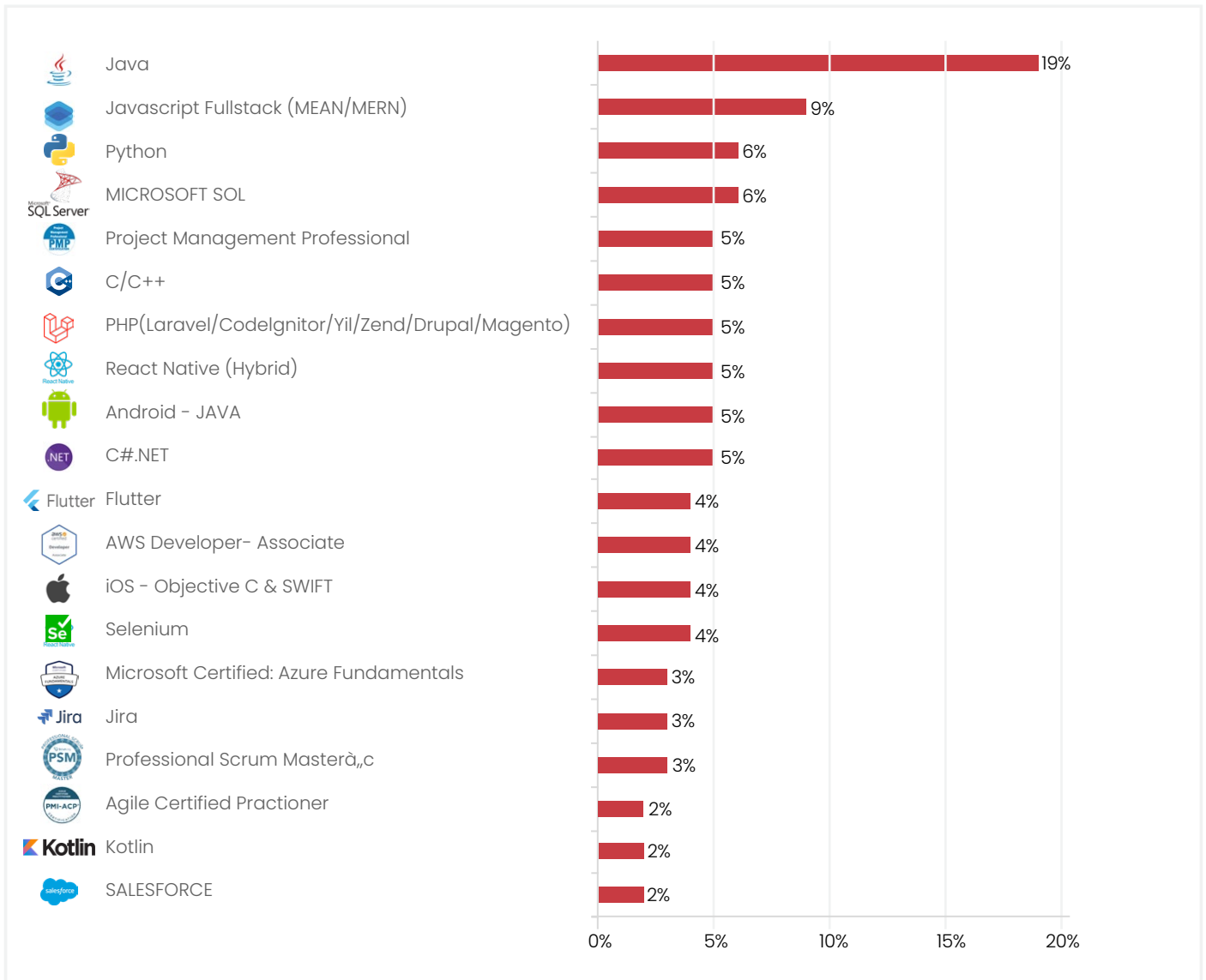
Top technical skills in-demand by the IT companies - Karachi



The Ideal Candidate Profile: **Industry Demands**



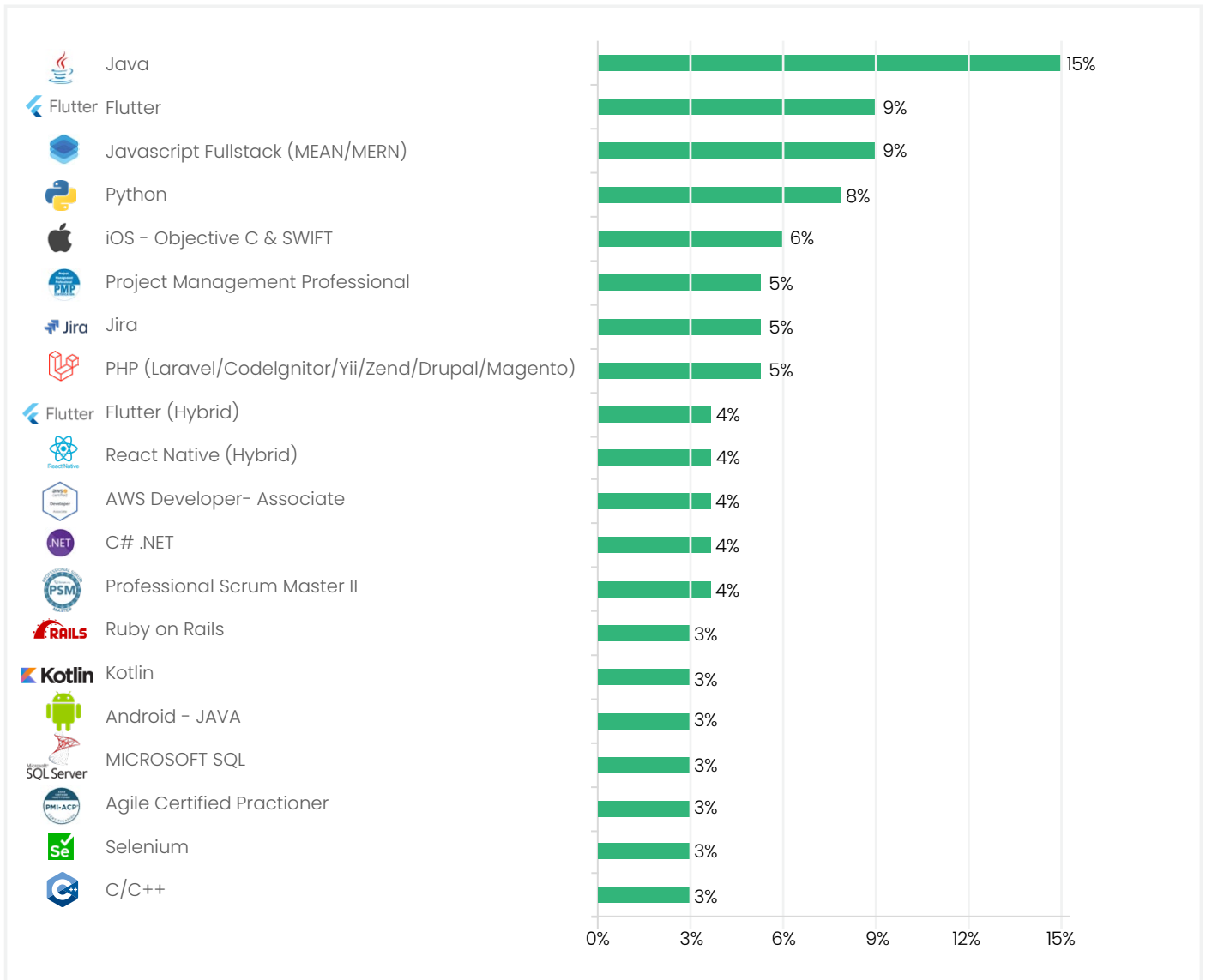
Top technical skills in-demand by the IT companies - Islamabad



The Ideal Candidate Profile: **Industry Demands**














Top technical skills in-demand by the IT companies - Lahore



Future Technical Skills Needs of Industry

Industry experts revealed during a series of interviews that they believe that some skills that will increase in demand even more so in the near future include the following;

 Mobile Application Development	 Full Stack Development Javascript (MEAN/MERN)	 Flutter Flutter	 QA Automation
 Cloud Solutions architecture and cloud services like AWS	 DevOps	 Kotlin Kotlin	 Selenium
 Azure Fundamentals	 Ruby on Rails	 PHP (Laravel)	



Skill set Supply of the Academia

The Current Profile of Fresh
Graduates





















Section 2: Current Technical Skill Analysis of the Fresh Graduates

Formal Education & Skill Set Development

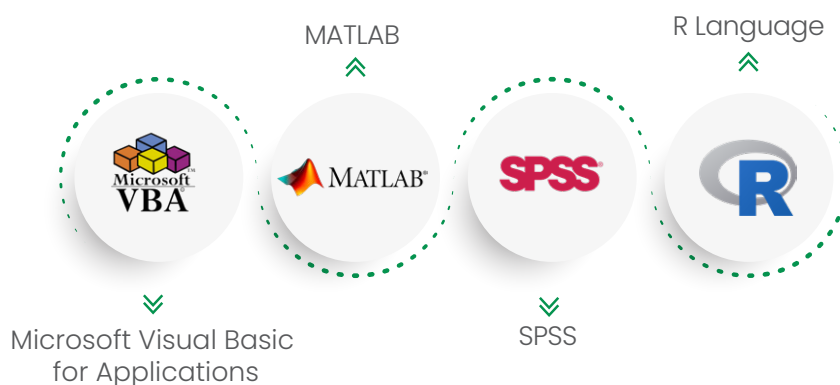
Formal education via university degrees plays a vital role in developing the desired skill sets to prepare students for their professional life. Degree programs usually aid in the development of a wide range of both, technical and non-technical skills.

The IT sector in Pakistan is a large potential employer for IT fresh graduate. Thus, it needs skilled resources equipped with the relevant technical and non-technical skills. The in-demand technical tracks from P@SHA IT skills requirement survey 2021 were shared with participants to identify the current IT skills of fresh graduates.

Top Technical Skills Taught in Universities – Nationwide

1  Android - JAVA	2  C/C++	3  Python	4  Javascript Fullstack (MEAN/MERN)	5  Microsoft SQL Server MICROSOFT SQL	6  C#.NET	7  Oracle Database 12c Administrator
8  MySQL 5.7 Database Administrator	8  Oracle Certified Professional	8  Project Management Professional	11  Unity	11  React Native (Hybrid)	11  PHP (Laravel/CodeIgnitor/Yii/Zend/Drupal/Magento)	14  Agile Certified Practitioner
14  CISM (Certified Information Security Manager)	16  Asana	17  AWS Developer- Associate	18  Flutter (Hybrid)	19  Jira	20  Professional Scrum Master™	

Apart from these, some other technical skills which are still being taught in universities with minimum relevance in the IT industry are:



Section 2: Current Technical Skill Analysis of the Fresh Graduates



Top Technical Skills Taught in Universities- Karachi

1 Android - JAVA	2 C/C++	3 Python	4 Javascript Fullstack (MEAN/MERN)	5 Oracle Database 12c Administrator	6 Microsoft SQL Server MICROSOFT SQL	7 MySQL 5.7 Database Administrator
8 Oracle Certified Professional	9 Project Management Professional	10 Unity	11 C# .NET	12 React Native (Hybrid)	13 CISM (Certified Information Security Manager)	14 PHP (Laravel/Codelgnitor/Yii/Zend/Drupal/Magento)
15 Jira	16 Flutter (Hybrid)	17 Agile Certified Practitioner	18 Kotlin	18 Microsoft Certified: Azure Fundamentals	20 iOS - Objective C & SWIFT	



Top Technical Skills Taught in Universities- Islamabad

1 Android - JAVA	2 C/C++	3 Python	4 Javascript Fullstack (MEAN/MERN)	5 Oracle Database 12c Administrator	6 Microsoft SQL Server MICROSOFT SQL	7 MySQL 5.7 Database Administrator
8 Oracle Certified Professional	9 Project Management Professional	10 Unity	11 C# .NET	12 React Native (Hybrid)	13 CISM (Certified Information Security Manager)	14 PHP (Laravel/Codelgnitor/Yii/Zend/Drupal/Magento)
15 Jira	16 Flutter (Hybrid)	17 Agile Certified Practitioner	18 Kotlin	19 Microsoft Certified: Azure Fundamentals	20 iOS - Objective C & SWIFT	

Section 2: Current Technical Skill Analysis of the Fresh Graduates

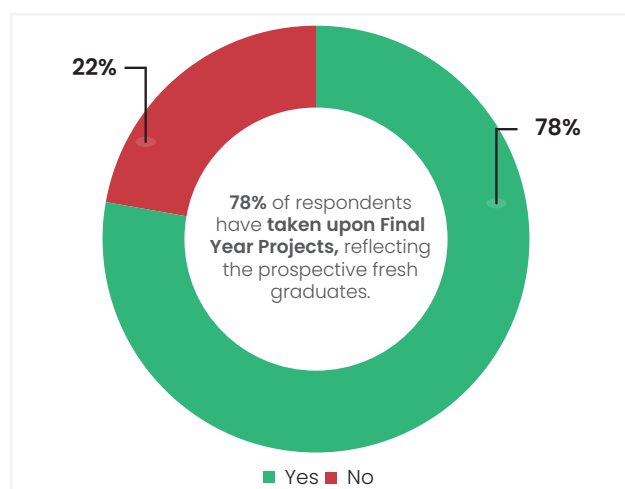


Top Technical Skills Taught in Universities- Lahore

1 C/C++	2 Python	3 Android - JAVA	4 Microsoft SQL Server MICROSOFT SQL	5 Javascript Fullstack (MEAN/MERN)	6 C#.NET	7 PHP (Laravel/Codelgnitor/ Yii/Zend/Drupal/Magento)
8 Asana	9 Unity	10 AWS Developer- Associate	11 Oracle Database 12c Administrator	12 React Native React Native (Hybrid)	13 Project Management Professional	14 Jira
15 Flutter Flutter (Hybrid)	16 Agile Certified Practitioner	17 Professional Scrum Master™				

Final Year Projects

When it comes to formal education, a very important skills development activity is the final year project (FYP). It usually goes beyond the course material and analyzes an issue or problem in depth through the use of an appropriate tool. Sometimes it results in the development of various prototype products as well. Hence, when it comes to exhibiting and learning skills, it is a useful matrix often looked upon by employers as well. For many technical programs, the Final Year Project (FYP) is a mandatory requirement, while it is a choice for others. According to a study sample, 78% of students have taken upon Final Year Projects; Industry experts suggest that online learning has affected the quality of skills and increased the training period for most graduates in the pandemic and post pandemic era. Companies are on the lookout for more experienced talent but are struggling to find the suitable resources. However, Final Year Projects based questions form an important part of the interview process and give a chance for students to quote relevant experience in industry relevant skills. These can prove to be pivotal in helping with securing a job.



In hopes of looking into the scope of the final year project streams that students are working on, the following list shows some popular ideas and methods practiced through FYP's. It has been observed most of the FYP projects are research-oriented rather than problem focused.



01

Research Projects

Data mining, analysis and research using a multitude of data analysis tools and visualization software



02

Application/Website development

App development & Website development using tools like Java, Mean/Mern, Full Stack, .NET C# and React Native



03

Computer engineering based prototypes

Small computer programmable machines e.g. automatic tennis machine



04

Machine Learning

Machine Learning based software e.g. emotion reader based on facial recognition, smart attendance at schools



05

IoT(Internet of things)

IoT Based systems e.g. for patient monitoring etc.



06

Cyber security

Data security based portals and software e.g. for banks



07

Blockchain

Using blockchain technology to manage information and develop setups e.g. set up energy trading market



08

Product design

IT product design e.g UX/UI based research on portal design and customer behavior, app development design analysis

Informal Education & Self-taught Skills

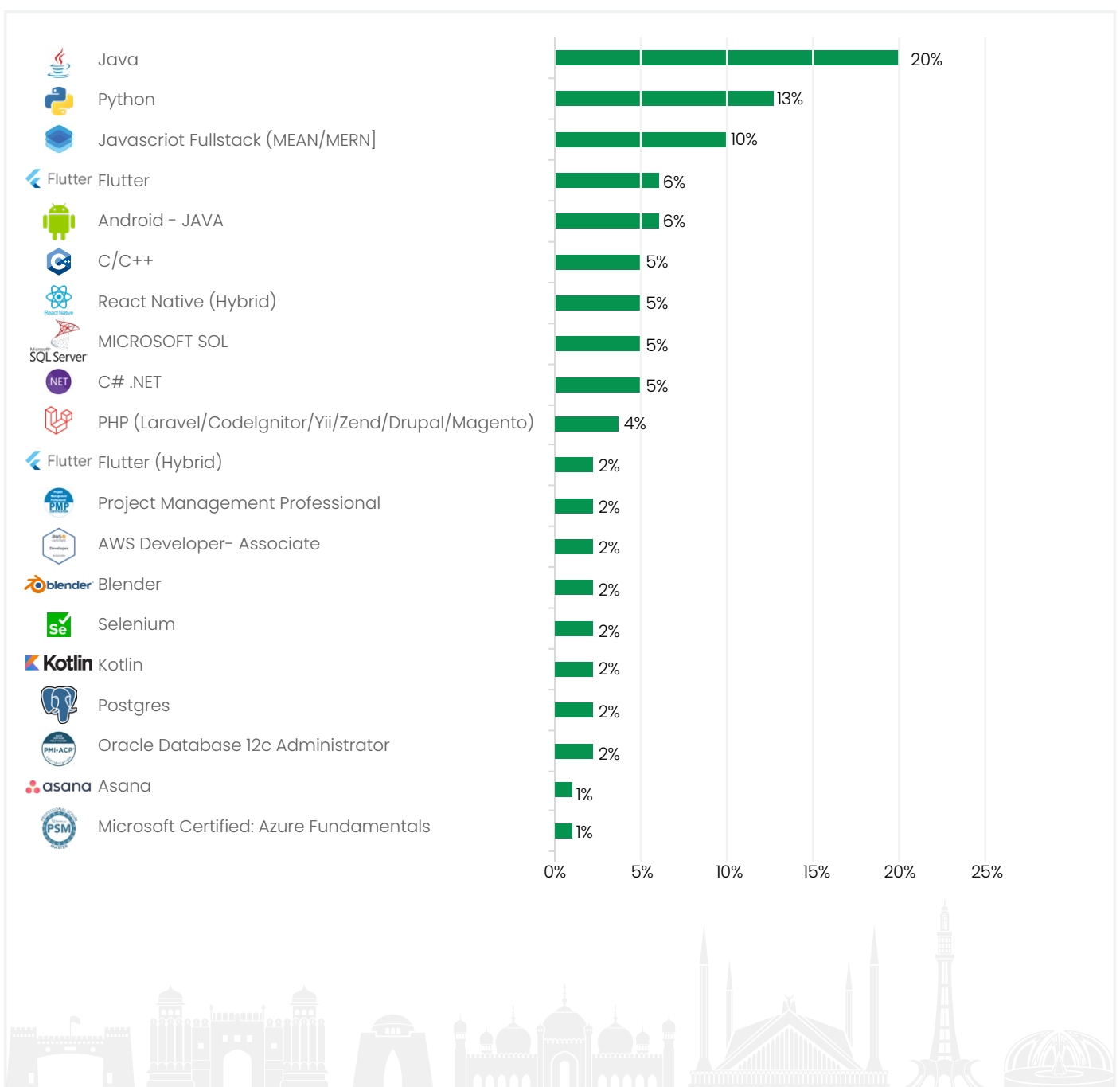
Since some students are mindful of their career paths, they make a conscious effort to acquaint themselves with a skill set that will make it easier for them to align with market needs.

Some common ways are;

- Online courses and certification programs
- In-person training through workshops, short courses etc.
- Extracurricular activities

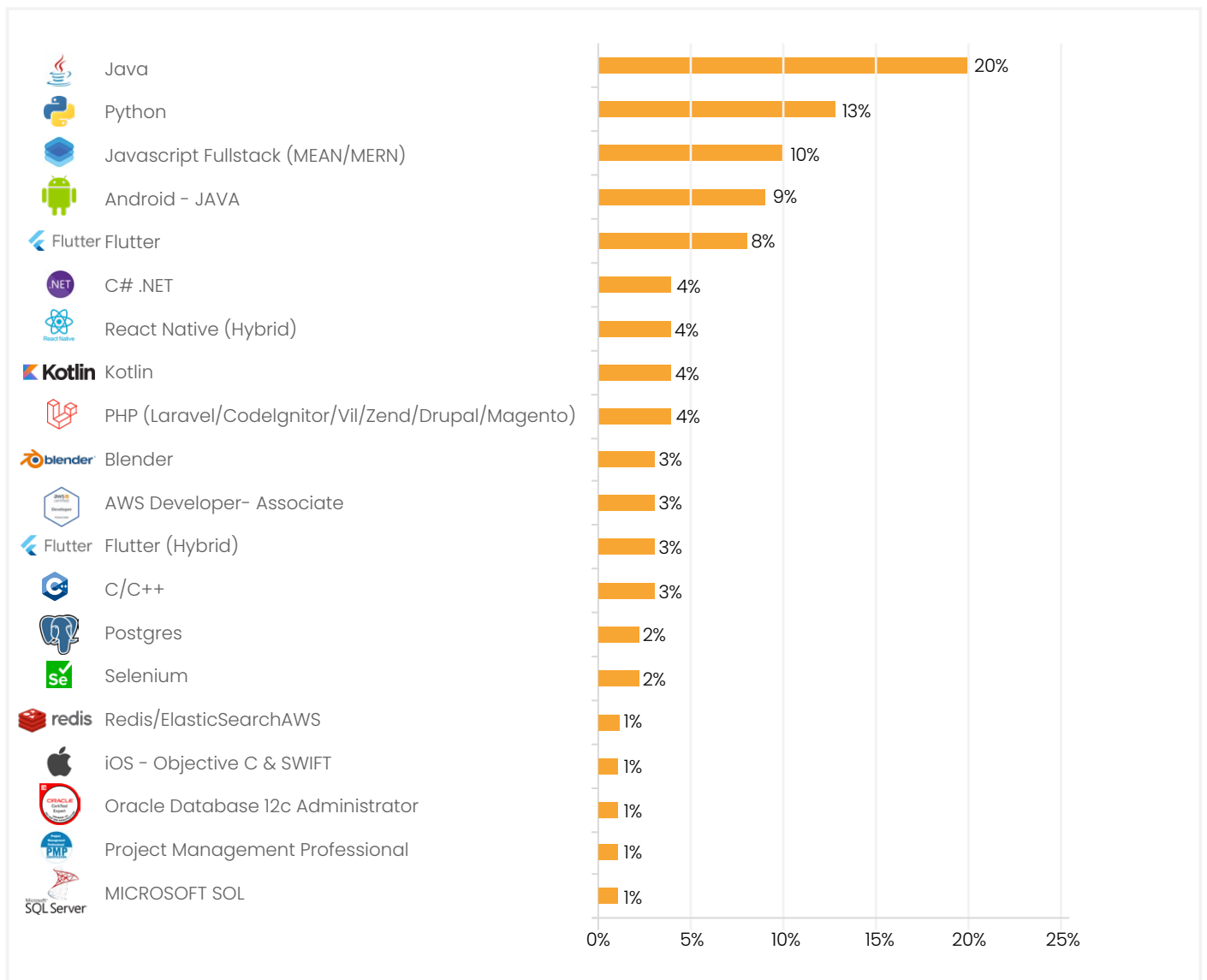
Some of the skills that students are actively working on learning through their own efforts includes;

Top Technical skills in-demand by the IT companies - Nationwide



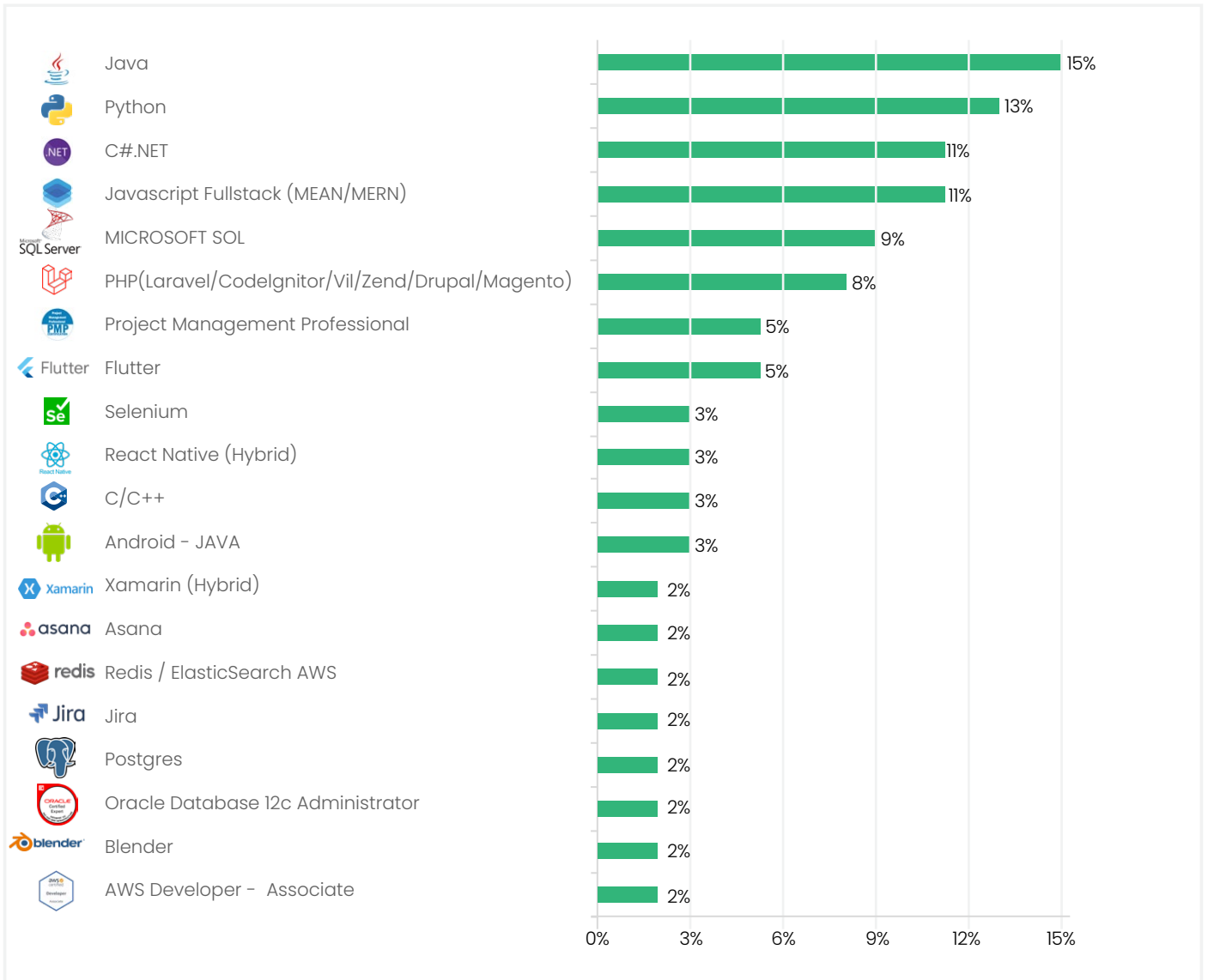


Top Self-taught Technical Skills Karachi



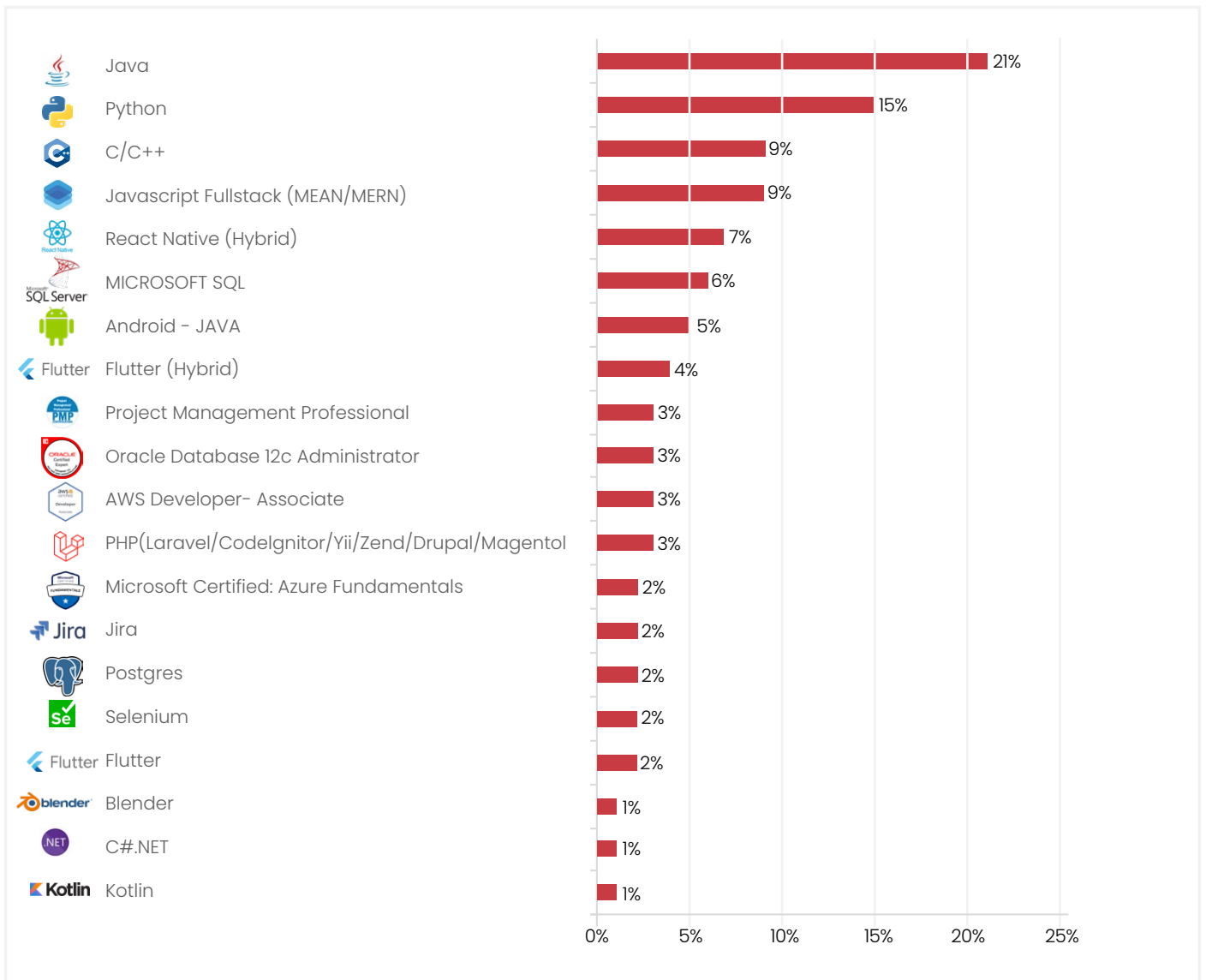


Top Self-taught Technical Skills Lahore





Top Self-taught Technical Skills Islamabad



Non-technical **skill set & soft skills**

As the number of non-technical roles increase, the focus on required and current non-technical skills is also important as we compare what soft skills students are able to learn and which employers think they have sufficient expertise over.

Required non-technical & soft skills as per Industry needs

When it comes to finding suitability for an organization, soft skills play a vital role in supporting a candidates' case. With increased operations, an enhanced focus on customer service and reliance on team-based operations, many IT companies are seen to consider soft skills as a pivotal reason to hire an individual. Some of the most sought-after soft skills nationwide are:

- Social Skills
- Problem Solving
- Team Work
- Critical Thinking
- Time Management
- Attitude
- Communication Skills

Non-technical & soft skills taught in universities

Even though technical roles are the most relevant to most IT companies who focus on IT product development, deployment and design, non-technical skills are also very significant since most technical roles have soft skills-based components to them. In most companies, the main product functions are supported by support functions like marketing, sales, finance etc. as well.

Moreover, in terms of professional grooming, soft skills are also very important and often sought out by most roles in IT organizations. These are important for the following reasons;

- Expanding international clientele' and international setups
- Increased competitive nature of the IT job market that render just technical skills not being enough

Hence, soft skills become rather important. Some of the most important soft skills being taught at universities are as follows;





'The Great Divide':

The Identification of the
Industry-academia
Skills Gap

Section 3: Identifying the industry-academia skills gap

Technical Skills Gap: Nationwide

Top 10 Skills: Industry Demand	Aligned with university preferences	Top 10 Skills: Taught at Universities	Aligned with Industry preferences
Java	●	Java	●
JavaScript Full Stack(MEAN/MERN)	●	C/C++	●
PHP (Laravel/Codelgnitor/Yii/Zend/Drupal/Magento)	●	Python	●
Python	●	JavaScript Full Stack (MEAN/MERN)	●
iOS - Objective C & SWIFT	●	MICROSOFT SQL	●
C# .NET	●	C# .NET	●
Flutter Flutter (Hybrid)	●	Oracle Database 12c Administrator	●
Android - JAVA	●	MySQL 5.7 Database Administrator	●
AWS Developer- Associate	●	Oracle Certified Professional	●
MICROSOFT SQL	●	Project Management Professional	●

More Focus Needed at Universities

- AWS Developer- Associate
- Android Java
- Flutter
- iOS - Objective C & SWIFT
- PHP(Laravel/Codelgnitor/Yii/Zend/Drupal/Magento)

Less Focus Needed at Universities

- C/C++
- Oracle Database 12c Administrator
- Oracle Certified Professional
- Project Management Professional



Section 3: Identifying the industry-academia skills gap



Non-Technical Skills Gap/Soft Skills: Nationwide

Top Non-Technical/Soft Skills In-demand by Industry	Aligned with university preference	Top Non-Technical/Soft Skills Taught by Universities	Aligned with industry preference
Social Skills	●	Communication & Presentation	●
Problem Solving	●	Research & Development	●
Team Work	●	Analysis and Presentation	●
Critical Thinking	●	Digital Marketing/ Social Media Marketing	●
Time Management	●	Content development & content writing	●
Attitude	●	Operations & Project Management	●
Communication Skills	●	Business Development/ B2B & B2C Sales	●

More Focus Needed at Universities

Technical Approaches to Non-Technical Skills
e.g. Marketing, Operations

Social Skills

Problem Solving/Critical Thinking

Time Management

Less Focus Needed at Universities

Theoretical Approaches to Non-Technical Skills e.g. Marketing, Operations



The industry's **take on the existence of the skills gap**

Industry experts weigh in on the reasons for the skills gap. Some of these include;

Lack of communication between industry and academia

The IT industry is moving into more advanced domains like AI and Blockchain etc. The education sector remains unaware of frequent changes of the technical tracks in the IT & ITeS industry.

The misalignment of formal education with local IT industry

Industry academia needs to be on same page to identify and mitigate the skills gaps.

Students' Unrealistic Expectations

Due to limited or no insights from the industry students lack the right information to make the informed decisions in choosing the right career. This sometimes leads to unrealistic demands and issues at the workplace.

Non-technical roles need to be augmented with soft skills

With time, technical job roles are expanded with non-technical job functions. Thus, the need of equipping technical resources with non-technical job functions is of utmost necessary

Bridging the Skills Gap

Organizational skill-building,
training programs and
need analysis

Section 4: Bridging the Skills Gap

Organizational Skill-building: Training

After hiring and analyzing the candidates, many companies work on the skills gap through training programs. So, we look into the training methods and topics that are considerably popular amongst companies in Pakistan.

Training Effectiveness

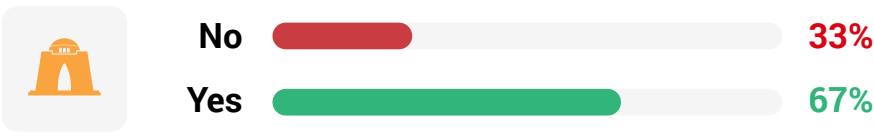
Many companies across the region believe that training is a useful practice and allows employees to fill the skills gap that is lacking when they join the organization.

Q. Does training fill the skills gap to fulfill company requirements?

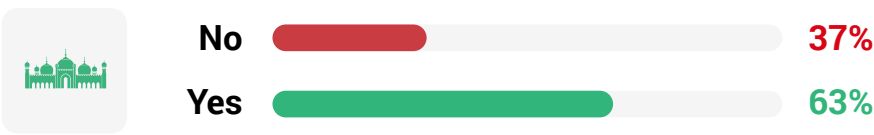
Most of the companies, Karachi (67%) and Lahore (63%), agree that training aids in closing the skills gap.

However, in some regions e.g., Islamabad, a lot of companies argue the opposite. This could be due to many reasons, some of which could include the following;

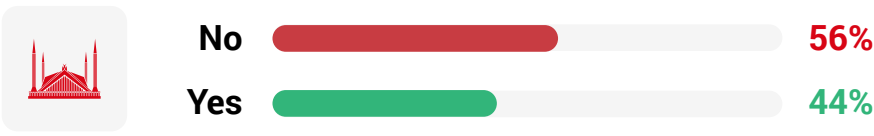
Karachi: 67% of companies agreed that training programs assisted in closing the skills gap



Lahore: 63% of companies agreed that training programs assisted in closing the skills gap



Islamabad: 44% of companies agreed that training programs assisted in closing the skills gap



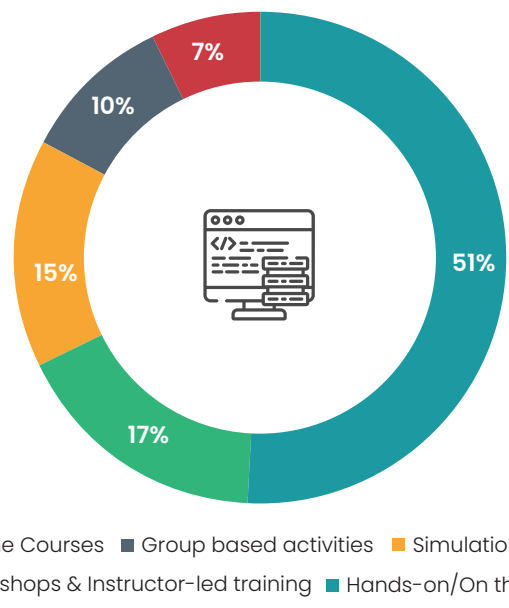
- Less skilled trainers and training partners
- Ineffective training evaluation practices that lead to training topics not being tested or accounted for
- Expected skills gap and supplied skills gap is too large

Section 4: Bridging the Skills Gap

Preferred Training methods/modes

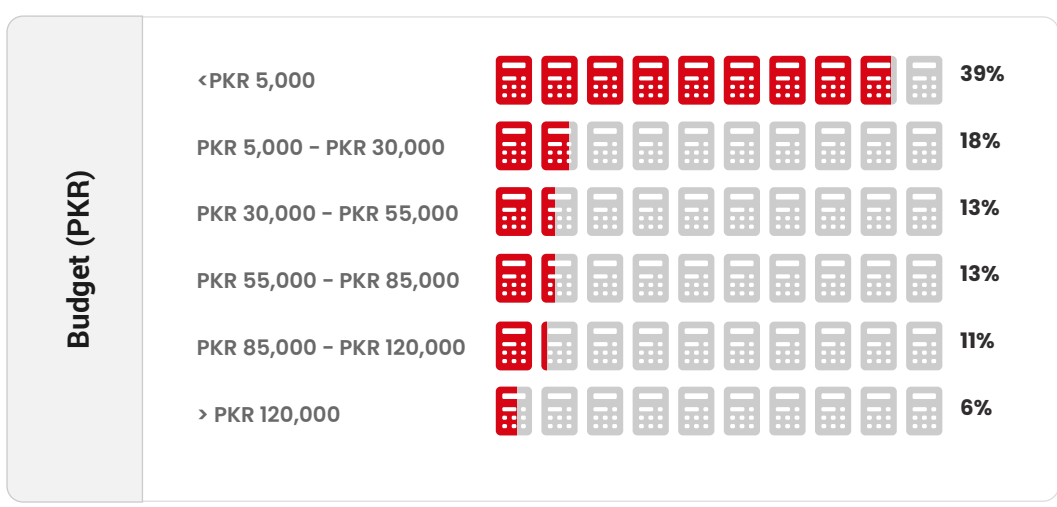
Q. What sort of training is most useful for your employees?

According to 51% of companies, hands-on/on job training is the most effective training method.



Training budget

Based on the company size and company needs, training budgets also vary across Pakistan. A look into the nationwide spread is given below.



On an average, 39% companies spend around PKR 5,000-30,000 annually per resource to train the resource as per their needs.

Hence, we see that on an average, training is an important expense for many companies and most companies spend around PKR 5,000-30,000 annually per resource to train the resource as per their needs.

Section 4: Bridging the Skills Gap

Training partners

Only 14% of companies have training partners and institutes to train their employees. Some companies who use training partners/institutes listed the following as good training sources and collaborators;

Q.

Do you use the services of the training partners/institutes for your employees?

Only 14% of companies have training partners and institutes to train their employees.



No 86%

Yes 14%

Online academies



Universities



On site learning

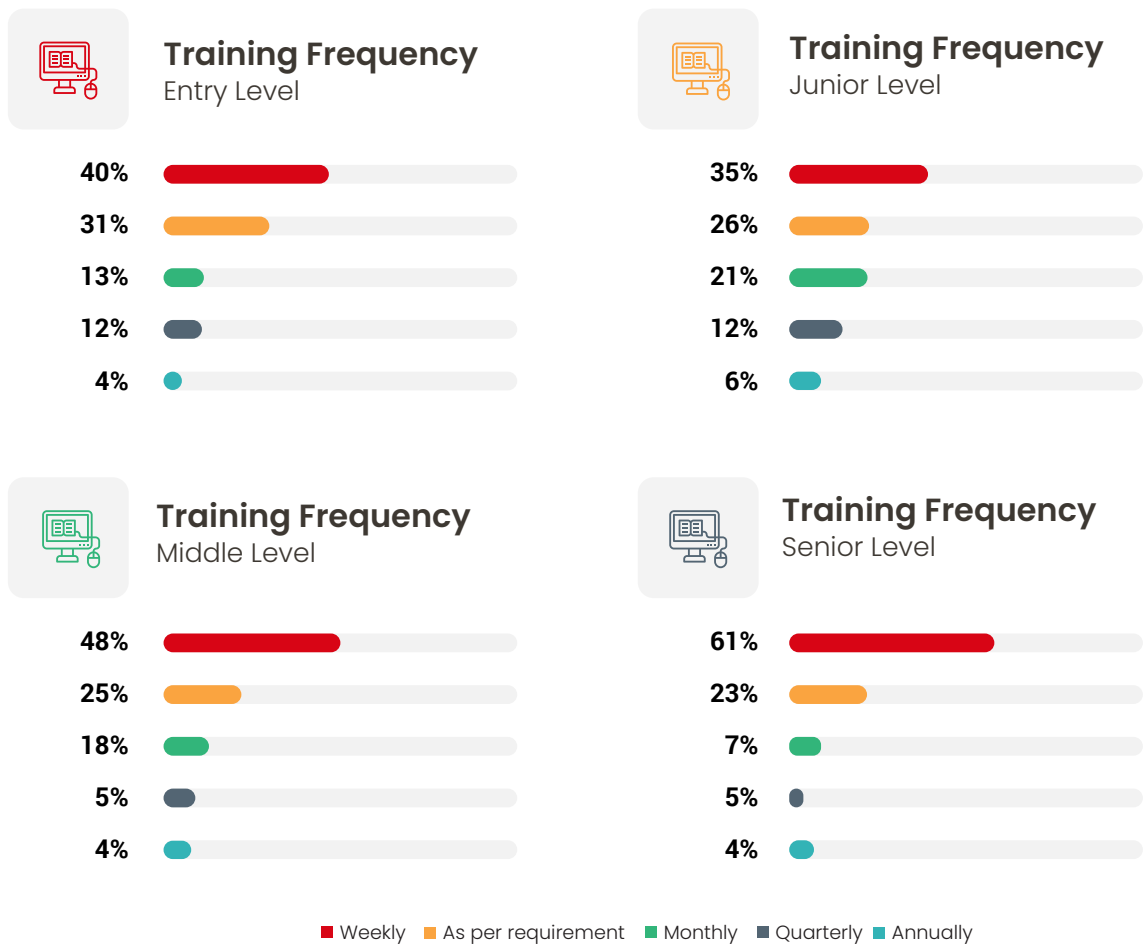


Section 4: Bridging the Skills Gap

Training Frequency

It is a common practice to have different types and frequencies of training at various levels of hierarchy. However, all levels of hierarchy evidently need training but at different times.

It can be observed how entry level and junior level employees are trained frequently. However, senior management is usually trained either quarterly or as required.























Another interesting insight is how most companies prefer to conduct training as and when needed instead of having a more structured annual training plan. This could be attributed to the following reasons;

- Many companies do not have a designated training wing and need to make many arrangements and dedicate resources to training that may affect budgets
- Planning for training is difficult since needs in the dynamic IT industry change frequently
- More companies are adopting a policy of asking employees to find training opportunities themselves to keep them involved, interested and focused on trainings to make them more effective

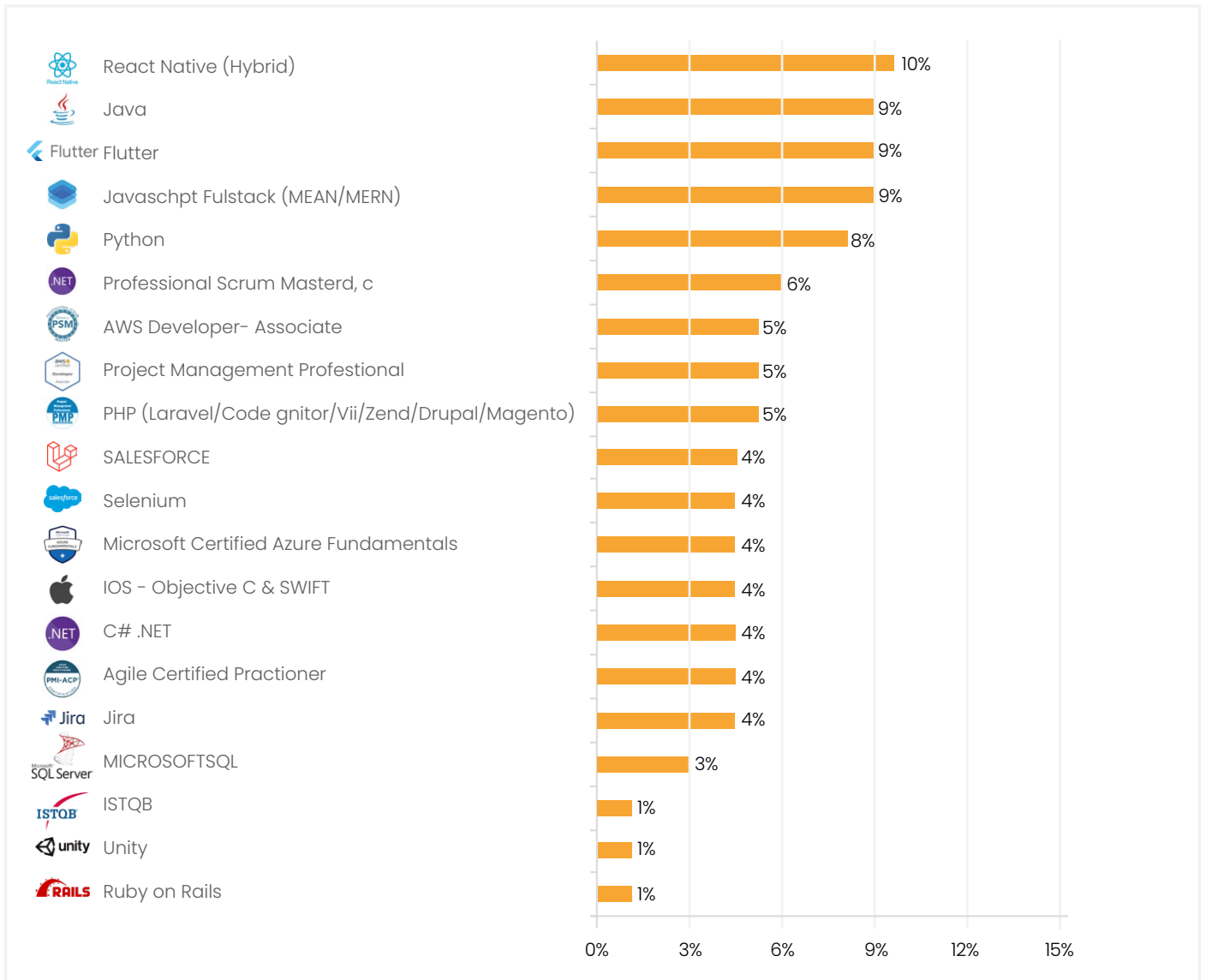
Section 4: Bridging the Skills Gap

Technical Training Topics – Nationwide

1  Javascript Fullstack (MEAN/MERN)	2  Android - JAVA	3  Flutter (Hybrid)	4  Project Management Professional	5  PHP (Laravel/CodeIgnitor/Yii/Zend/Drupal/Magento)	6  Python	6  Professional Scrum Master™
7  React Native (Hybrid)	8  AWS Developer- Associate	9  Selenium	10  Microsoft SQL Server MICROSOFT SQL	11  iOS - Objective C & SWIFT	12  Microsoft Certified: Azure Fundamentals	13  C# .NET
14  Jira	15  SALESFORCE	16  C/C++	17  Kotlin	18  Flutter (Hybrid)	20  Agile Certified Practitioner	

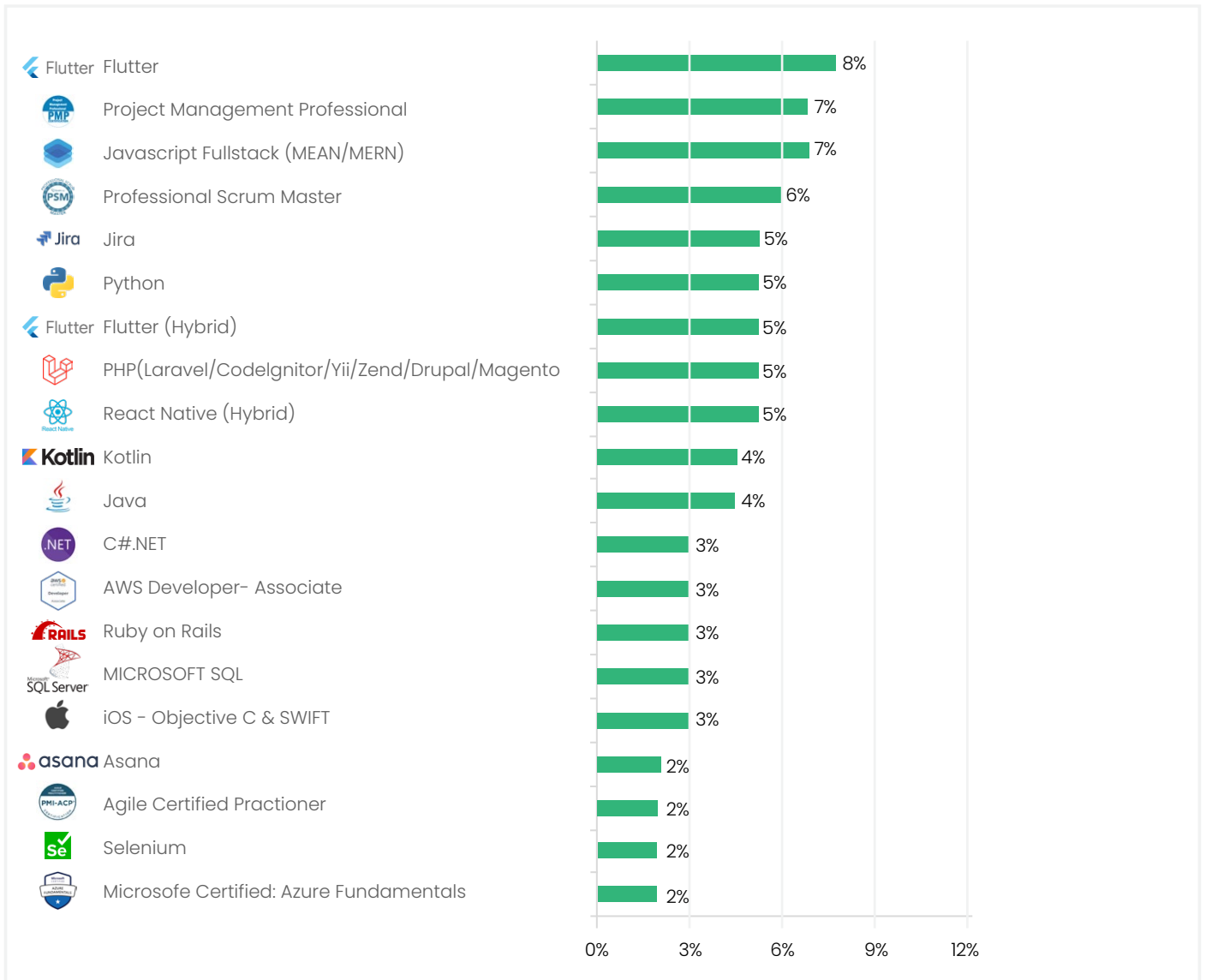


Top Self-taught Technical Training Skills Karachi



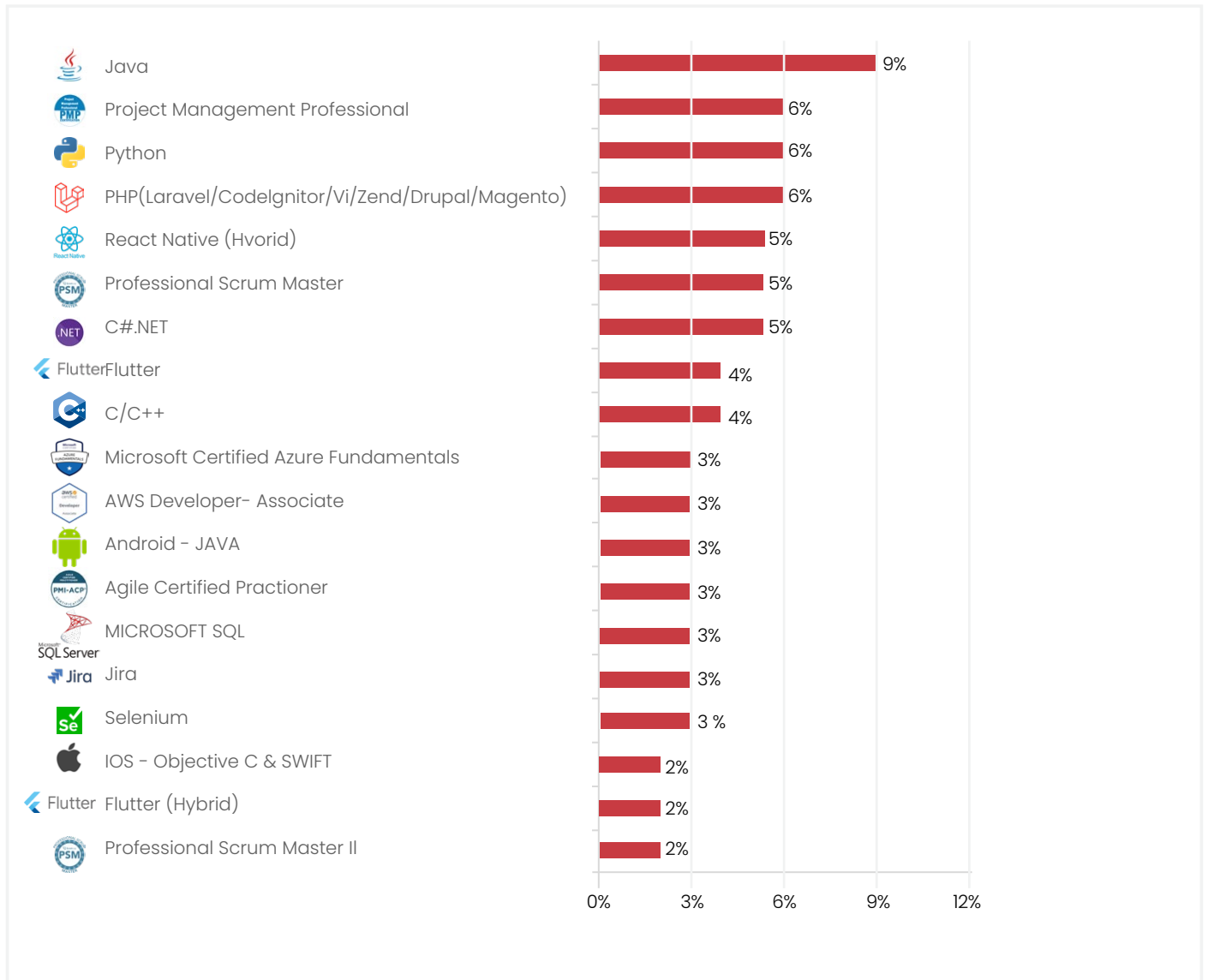


Technical Technical Training Topics – Lahore





Technical Technical Training Topics – Islamabad





The Job Market

Section 5: The Job Market

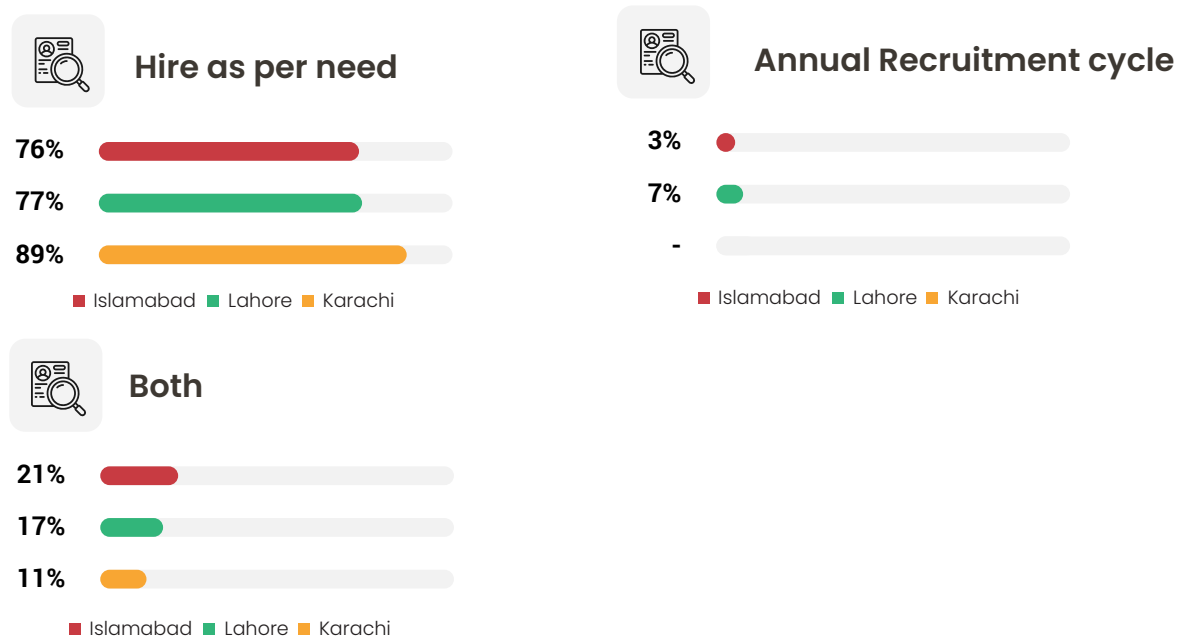
After analyzing the considerations and skill sets needed for securing a job, it is also important to look into the hiring habits and scope of securing a position in the IT sector of Pakistan. In order to understand the dynamics of the IT industry and skills in demand, it is imperative to look into the job market, the hiring frequency and recruitment cycle.

Annual Hiring Practices

As seen below, most IT companies seem to prefer hiring as per need across all regions. This hiring behavior is possibly due to the following reasons;

- Many IT companies work on a project basis and hire a resource only when the need for them exists
- The industry itself is dynamic and has rapidly changing needs, hence the need for hiring as these needs changes becomes more relevant than hiring annually in a more routine manner
- Highly technical resources or those skills in technology tracks that are uncommon are rare in the market, so setting up an annual demand for them is not feasible. It is instead more useful to seek them out and hire as needed

Hiring Frequency across regions



Majority of the companies across hire as per their need and requirements

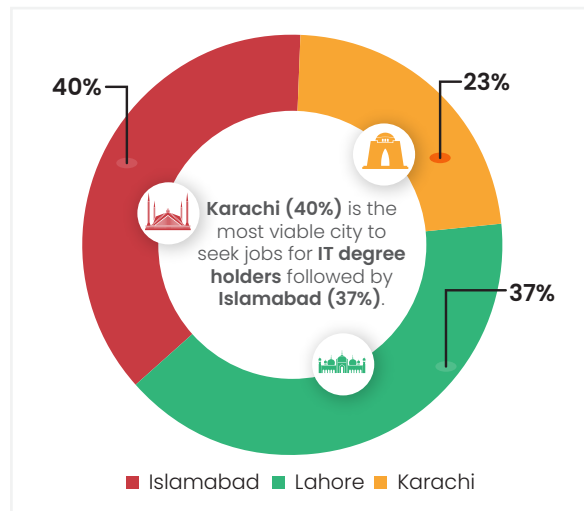
This hiring as per need behavior is also indicative of another issue; the inability to reach the best candidates from universities.

Insight: Universities usually commence placement efforts in the Spring semester through the beginning to mid-year. If IT companies are not able to reach out to them effectively at this time, they are likely to lose out on a good batch of candidates most of whom are able to secure jobs early on due to their good skill set.

Section 5: The Job Market

Vacancies filled by companies on annual basis

If we look into the number of jobs that are made nationwide annually, the results are as follows; As seen above, most IT and ITeS companies only fill less than 10 positions each year. This shows that the number of jobs being offered by the IT sector are limited. This could be possibly due to;



- Lack of skilled resources to meet the company's needs
- Good employee retention that reduces the need to hire more often
- The emergence of small IT setups that are less dependent on human resource presently and do not need larger teams

Furthermore, there are many companies that hire 100+ people annually, this is potentially because of;

- Diversified business operations that require larger teams
- Access to appropriately skilled resources and a need for less skilled people as well
- International business operations and larger setups

Hiring Mediums

Industry experts suggest that some of the most important hiring mediums include;

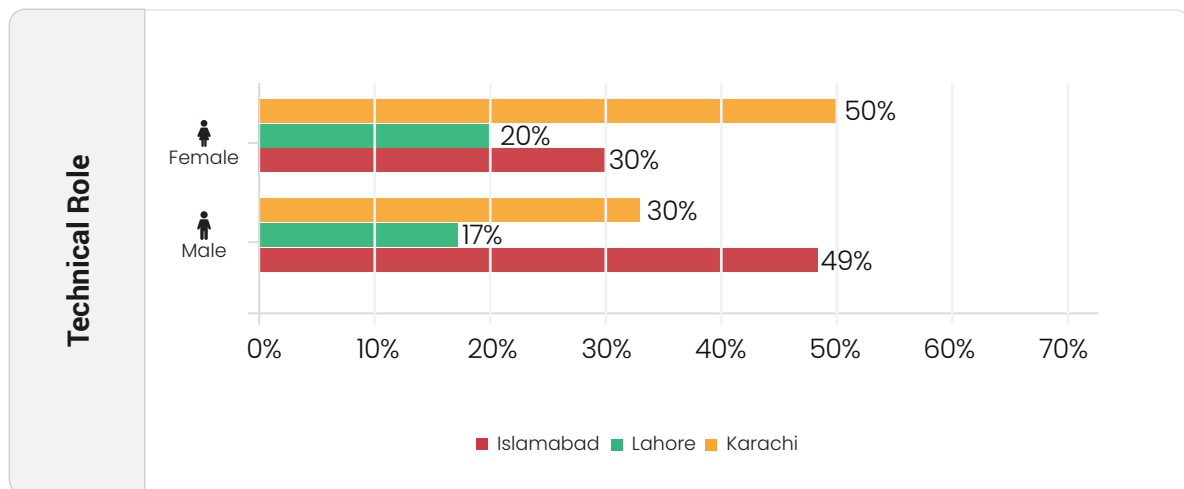
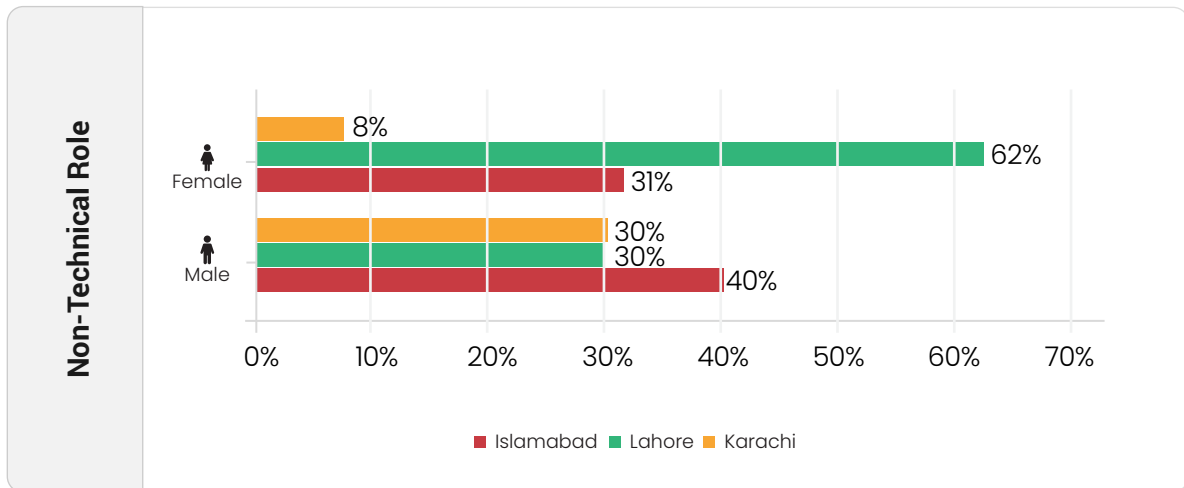
- **Linked In**
- **Referrals from employees**
- **Alumni networks of existing employees**

The approach to seeking out candidates is changing. A shift to seeking out candidates using the approach of talent acquisition rather than talent hunting is becoming more common. Companies sift through resumes and profiles and reach out to candidates themselves via linked in and emails to offer them a chance to interview for a position. This has become important as less resources are pr cal yet more sought-after skills e.g., Full Stack development

Section 5: The Job Market

Sought-after job roles as per fresh graduates

Many students have predetermined career paths in mind when going into a degree program and are mindful of the kind of job opportunities they want to look for upon graduation. When it comes to the IT sector, the difference between the roles sought out by fresh graduates is as follows;



Section 5: The Job Market

The COVID-19 Impact

Much like everything else, COVID-19 has had an effect on the job market in Pakistan and led to a few changes when it comes to hiring. Industry experts suggest that some post-pandemic changes include;

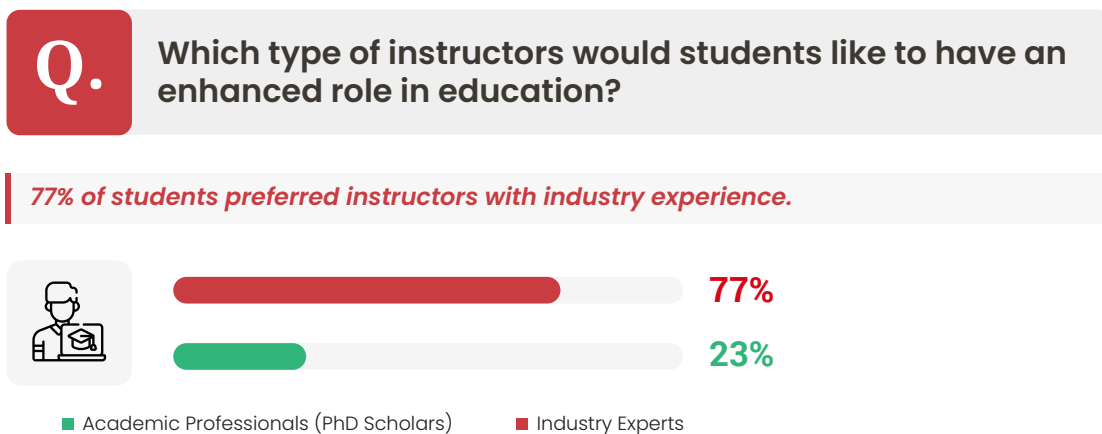
- **Hiring of fresh graduates after COVID-19:** As more companies have started to struggle financially, they are unable to keep up with the financial demands of skilled and expensive personnel. Hence, to **fill their resource gap**, many are focusing on hiring and training the fresh graduates.
- **The increase in remote working opportunities increased local resignations:** The availability of remote job opportunities with higher salaries are causing frequent job switching thus resulting in **'great resignation'**. Hence, many companies are allowing **remote work** as a regular possibility to retain key resources

Further Insights: The Education System & Amendments

The education system

The research also looks into the education system and the kind of enablers and issues that seem to affect the skill development abilities of institutes. One of the most important aspects of this is the composition of the faculty and the involvement of the faculty in terms of being well-versed with the needs of the industry.

The students also seem to be keen to have executives teach them about the dynamics and skills required in the industry. The survey results suggest that executives in residence are popular and sought-after instructors





Recommendations

Industry-Academia
Collaboration Model



Section 6: Recommendations to bridge the gap: The Industry–Academia Collaboration Model

The lack of skilled resources in Pakistan is the biggest bottleneck in achieving the desired export growth. An emergency strategy needs to be devised for addressing this challenge. As per P@SHA Skill Requirement Survey 2021, there are over 40,000 job openings in just 140 companies. This represents the potential of impact a strategic approach can create. In order to bridge the skills gap, a set of steps can be taken by both industry and academia to ensure that better communication and exchange of ideas. In order to come up with an efficient model we consulted both academia and industry.

The following model is designed based upon the insights received. This model can be executed in 3 phases as follows;



Phase 1: Active Communication

Step 1: Industry–academia discourse

- A curriculum **committee composed of representatives from both industry and academia** to conduct focus groups and to devise and develop course outlines as per industry needs.
- **Talks/seminars and guest lectures needs to be conducted frequently to work for promising collaboration opportunities.**
- Industry experts can be invited to **teach as executives** in residence for degree and diploma programs and if possible, or train colleagues as per industry needs
- **Programs like Accademia-Bridge Program provides perfect opportunity to** form a joint collaboration between an IT company (industry partner) and a university (academic partner) to provide hands-on training to students by replacing their course labs with a newer technology stacks and bringing in senior engineers and technologists from the industry to conduct these labs.
- The awareness programs and campaigns for high-potential career opportunities in IT/ITeS industry in Pakistan can be initiated and promoted.

Section 6: Recommendations to bridge the gap: The Industry–Academia Collaboration Model



Phase 2: Training & Educational amendments

Step 1: Professional Training & Development

- A set of volunteer companies and universities can set up networking and mentoring programs such **mentor–mentee programs**. It can help in connecting industry experts to a hiring pool of potential professionals for the industry.
- The industry and academia can form partnership to conduct **training programs, boot camps, prototype building competitions etc.**
- **Public-private training institutes** can be created for **reskilling and upskilling** of the fresh graduates and professionals.
- Arrangement needs to be made to pay more attention in building and nurturing **soft skills** e.g., presentation skills, team work etc.
- **Mandated industry training programs** for technical degrees by expanding to industry-relevant projects should be developed.

Step 2: Formal Education based amendments

- Curriculum working groups can be formed to keep the curriculum relevant with the industry need and demands. It will help in finalizing the **industry-approved curriculum**
- Majors and Minors in specific **computer science fields needs** to be developed e.g., App development, cybersecurity, block chain, VR/AR etc.
- **Degree programs with varied duration** (e.g. 2-year associate degree instead of bachelors) should be introduced.
- Launch **short-term conversion programs** for graduates of other fields/domains to facilitate transition to the IT domain
- Companies can outsource work to universities especially through **FYP projects**. A list of prospective projects can be shared with interested universities.

Section 6: Recommendations to bridge the gap: The Industry–Academia Collaboration Model



Phase 3: Recruitment & Feedback

Step 1: Assist Recruitment
























































- ⦿ Increase IT graduates to 100,000 per annum through **outreach rural support programs** and provide scholarships to students from rural and far-flung areas.
- ⦿ **Incentivize job creation** by offering IT companies tax benefits against job creations for the economy.
- ⦿ Industry sponsored **internship and apprentice opportunities** need to be introduced.
- ⦿ Develop a collaboration model where **final year projects** are problem focused which can help students developing relevant skills and contribute to the hiring process.
- ⦿ **Career counseling offices** need to become more proactive educate students about career paths, expectations and help develop industry knowledge
- ⦿ Most large companies hire from top tier universities due to good academic reputation and good **industry linkages** that they maintain. More institutes need to follow this
- ⦿ More universities need well structured and **proactive placement offices** to help graduates secure jobs and support communication of industry needs to the candidate




























Step 2: Feedback

- ⦿ Hold **bi-annual meetings** to gather feedback from industry to gauge the impact of the implemented programs and initiatives.
- ⦿ Develop an yearly roadmap of **skill development initiatives** in consultation with both academia and industry.

Participating Companies










Participating Companies

 Jin Technologies Private Limited		 digitz EMPOWERING ACTIVITY	 MTECH Solutions	 Communication Square
 eShaafi.com	 BITLOGI EXPLORING DIMENSIONS...	 TECHNOLOGIES	 SYNERGY-IT	 Deline Media
 INFOGISTIC®	 SPARTANS GLOBAL PRIVATE LTD.	 S&P Global Market Intelligence	 iomechs	 ConsoliAds
 IDEOFUZION	 K P S KOMATSU PAKISTAN SOFT	 invozone	 TEP Trade Exporters Pakistan (Pvt) Ltd.	 ONE NETWORK FOR ALL
 iTACK SOLUTIONS		 codeninja	 Brickclay	 INFOTECH BRILLIANTLY BUILT
 UFORIA	 SOFTOO	 EXPERLABS	 BenchMatrix>	 glowlogix
	 SHOPIFY Pro	 csp	 target	 Zeta Technologies (Pvt.) Ltd.
 SMART IS PAKISTAN	 M.M.	 CONTOUR Software CORPORATE & CREATIVE SOFTWARE PVT. LTD.	 THE KNIGHTS imagine. create. inspire.	 SERVER4SALE ADVANCED HOSTING & WEB SOLUTIONS
 ZIGRON	 DPL	 Boundless Technologies Digital Agency	 XFLOW RESEARCH	 telenor group
 IT Solutions ArhamSoft Private Limited	 Traffic Digital	 PSW PAKISTAN SINGLE WINDOW	 KUCH KARO	 FabIntel Moving Innovation
	 zip24	 zameen.com Har Pata, Humain Pata Hai	 NOVA	

Participating Universities

Students from these universities participated in the research.

The Great Divide: The Industry-Academia Skills Gap 2022

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